ASSESSING AND ADDRESSING LETTER-NAME KNOWLEDGE, A CRITICAL ATTRIBUTE IN KINDERGARTEN READINESS: A MIXED METHODS APPROACH

A Record of Study

by

ANGELIA HORTON KNIGHT

Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

Chair of Committee,   Zohreh R. Eslami
Co-Chair of Committee,   Monica V. Neshyba
Committee Members,   Edie Cassell
                         Anita McCormick
Head of Department,   Michael de Miranda

December 2017

Major Subject: Curriculum & Instruction

ABSTRACT

Kindergarten students often struggle with the task of fluently identifying letters in the alphabet. Early acquisition of letter identification serves as a strong predictor of reading success and a lack thereof is often a key indicator of future reading difficulties. If students are unable to read fluently in the early elementary grade levels, statistics indicate they are more likely to experience significant academic difficulties throughout their educational careers, which may impede their success even into postsecondary. In this study, literacy screener assessment scores for letter-name knowledge will be examined at three intervals during the implementation of a kindergarten intervention. The purpose of this study is to examine whether there is a significant increase in the percentage of kindergarten students who score on grade level in letter identification with consistent, daily, non-sequential upper and lowercase letter practice. A treatment group consisting of 42 students was provided the randomized letter intervention five days per week for a period of 5-minutes daily for a total of 10-weeks. The Istation® Letter Recognition Assessment results for the treatment group were compared to the results of 21 students in a control group. The control group did not receive the non-sequential letter daily intervention; however, continued to receive traditional letter knowledge instruction. The results revealed that with, consistent intervention in non-sequential randomized letter naming, student participants were able to master the task of rapid letter naming with automaticity over a 10-week period when compared to a control group. The proposed results highlight the importance of explicit non-sequential letter name knowledge

instruction in this sublexical skill considered to be one of the initial building blocks for

earliest efforts at decoding and spelling.

DEDICATION

      This paper is dedicated to my family and friends that believed in me and never

wavered in their unconditional support during this incredibly stressful journey in my life.

Thank you to my husband, John, that was basically a single dad for four years. I also

want to thank my children for being my own personal cheerleaders; thank you, Jalyn,

Landry, and London. This has definitely been the most difficult thing that I have ever

undertaken up to this point, but I would not change anything. This incredible opportunity

has made me stronger than I could ever imagine, and I am confident that I can overcome

any obstacle that life throws my way.

ACKNOWLEDGEMENTS

I would like to thank my committee members for their continued support throughout this process and to my chair, Dr. Eslami, for helping me so much during this journey. However, I must abundantly thank Dr. Neshyba, my co-chair, for the hours that she spent over the last year working with me. I have definitely spoken with Dr. Neshyba over the phone more than I have with my own mother over this year; words simply cannot express my eternal gratitude to her. Lastly, I would be remiss if I did not thank, Shaun Ko, who conducted the quantitative analysis component for this study. I could not have done it without him.

CONTRIBUTORS AND FUNDING SOURCES

NOMENCLATURE

ANCOVA   Analysis of Covariance

ANOVA   Analysis of Variance

CAT   Computer Adaptive Testing

CPM   Continuous Progress Monitoring

DIBELS   Dynamic Indicators of Basic Early Literacy

EAK   Enhanced Alphabet Knowledge

ILS   Integrated Learning System

IRB   Instructional Review Board

ISD   Independent School District

MKO   More Knowledgeable Other

NCLB   No Child Left Behind

QUAL   Qualitative

QUAN   Quantitative

RAN   Rapid Automatized Naming

RAS   Rapid Alternating Stimulus

ROS   Record of Study

SES   Socioeconomic Status

TEA   Texas Education Agency

ZPD   Zone of Proximal Development

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

The Problem Space

Large percentages of kindergarten students often score below grade level in letter naming which is contingent to future reading success. Letter-name knowledge is one of the most effective predictors of early literacy skills (Scarborough, 1998; Whitehurst & Lonigan, 1998), later elementary reading ability (Denton, West, & Walston, 2003; National Early Literacy Panel, 2008; Whitehurst & Lonigan, 2001) and high school achievement (Cunningham & Stanovich, 1997). Based on my experience as an Early Childhood Literacy Specialist, antiquated instructional methodologies for teaching letter naming still dominate many kindergarten classrooms. One of those methods is teaching one letter per week, which does not provide the in-depth letter practice that students require and often wastes valuable instructional time teaching letters that many students have already mastered (Dougherty Stahl, 2015). This type of methodology treats each letter equally (Dougherty Stahl, 2015). There is research to substantiate that some letters are easier to learn than others (Evans, Bell, Shaw, Moretti, & Page, 2006; Huang et al., 2014; Justice, Pence, Bowles, & Wiggins, 2006; Piasta & Wagner, 2010b).

Anecdotally, teachers rely too heavily on singing the alphabet song as another of the primary strategies for improving student cognition in letter naming. Often, children are first taught the letter names through the singing of the alphabet song prior to being taught to differentiate and recognize the shapes of the individual letters of the alphabet (Smith, 2000). However, children typically memorize the lyrics to the alphabet song,

1

and the singing of the song does not necessarily improve a child's ability to identify the individual letter shapes. Another overutilized strategy for letter learning is the reading of alphabet books. Both de Vries and Bus' (2014) study determined that alphabet books may be a stimulus for alphabetic knowledge; however, the format of an alphabet book may interfere with students' letter learning due to students' fixation on the pictures versus the presented letters. Many other archaic teaching practices simply revolve around the letters solely being presented in alphabetical order. McBride-Chang's (1999) findings imply that kindergarten students know more letters that occur early in the alphabet string compared to those that come later. Evidence also suggests that children learn the letters in their own names relatively early which might suggest that a focus on the more difficult to acquire letters ought be considered (Justice, Pence, Bowles, & Wiggins, 2006). Therefore, it seems logical to assume that instructional approaches for letter naming should create linkage between the letters' names and attributes while providing students with non-sequential letter practice order in order to focus on letters less likely to be known.

In Lancaster ISD, traditional curricular approaches for addressing alphabet knowledge follow a general framework. The letter for the week is designated by the Texas Treasures Reading/Language Arts Program from Macmillan/McGraw-Hill. Treasures was adopted by the district in 2006. Treasures is a comprehensive research based curriculum designed to engage students and enhance reading proficiency. The program provides instruction in the five essential elements of early literacy: phonemic awareness, phonics, reading fluency, vocabulary development, and reading

comprehension strategies (Frechtling et al., 2007). Kindergarten teachers in the district

follow the Treasures curriculum lockstep and for purposes of this study, the discussion

will focus on alphabet instruction, which falls under the heading of phonics.

Treasures introduces students to the letter of the week on day one or Monday.

Students are shown a Sound Spelling Card that displays the letter of week along with a

picture that that begins with the same letter sound. An example might be the letter S and

the accompanying picture on the Sound Spelling Card would be that of a sun. The

teacher would go over the letter name and sound with students as an introduction. Later,

the teacher would transition to the Teaching Chart that would provide a story, rhyme, or

poem that utilized the letter S throughout. The teacher would read the story, rhyme, or

poem and would then point out all words that begin with the letter S. The independent

practice would provide students handwriting practice forming the letter S. Day 2 would

be a review of the letter introduced the previous day. The teacher would again utilize the

Sound Spelling Card to bring students attention to the letter S and the picture of the sun.

The activity would entail the teacher writing a short list of CVC words on her board and

having students identify words that begin with the letter S. The guided practice typically

involves blending CVC words with the letter s and other letters that have been

previously introduced. On day 3, the teacher would have the Word-Building Cards and

would model for students building a CVC word with s as the first letter and the other

letters utilized would be previously introduced letters. The teacher would have students

practice identifying the letter S and would have students practice the letter sound.

Students would then make CVC words using the letter S as their guided practice

utilizing Word-Building Cards. Day 4 would review the letter S with students using the

Word-Building Cards. Students would then participate in a picture card sort and would

identify picture cards whose building sound was the letter S. The guided practice would

entail students building and blending CVC words that begin with the letter S utilizing the

Word-Building Cards. The independent practice for students would be filling in the

blank with CVC words that begin with the letter S utilizing the Treasures student

workbook. Day 5 would begin with the teacher referencing a sentence on the board and

having students chorally read the sentence along with the teacher. The sentence would

include a CVC word that began with the letter S. The class would continue identifying

the letter S within several similarly structured sentences. The next activity would be

comprised of a dictation component where the teacher would provide the name and

sound of a letter and students would be asked to write the letter on their individual white

boards or paper.

In Lancaster ISD, alphabetic knowledge is addressed in whole group, small

groups, and centers. Kindergarten teachers practice the letters of the alphabet daily via

the alphabet song daily. Alphabet videos are also shown daily to provide an additional

mechanism in which to practice the letter names and sounds. During centers, students

engage in multiple activities thought to strengthen students' alphabetic knowledge, such

as but not limited to: making letters with playdough, shaving cream, gluing items that

begin with the letter on a letter template (i.e., macaroni on the letter M), alphabet

puzzles, matching letters to picture cards, handwriting, and forming the letter shapes in

sand, rice, or gel bags. The activities listed are very traditional in their approach but do

not necessarily provide the repetition and practice necessary for letter mastery based on the law of 10/20, which is the optimal timeframe required for letter names to be transferred to long-term memory (Cepeda et al., 2009; Cepeda, Vul, Rohrer, Wixted, & Pahsler, 2008; Pashler et al., 2007; Rohrer & Pashler, 2010). It takes approximately 26 school weeks (i.e., middle of March) for Lancaster ISD students to progress through one instructional alphabetic cycle utilizing a letter per week pacing, further disadvantaging students at-risk for reading difficulties (Piasta & Wagner, 2010). Spending significant time daily on one letter of the alphabet monopolizes instructional time from other more difficult to acquire letters (Jones, Clark, & Reutzel, 2012).

The Problem of Practice

    Context/setting. Lancaster Independent School District is located in a rural north Texas town about 15 miles south of the city of Dallas and is one of the largest predominantly African American school districts in the state of Texas. The total student population of the district is approximately 7,579 and the demographic makeup is as follows: 78% African American, 18% Hispanic, and 3% White. The median household income is about $49,404, which is low when compared to neighboring Dallas, which is approximately $58,926. The percentage of at risk students in the district is upwards of 54%. Lancaster Elementary School is one of seven elementary campuses in Lancaster ISD and about 37% of the students are considered at-risk. The total enrollment of Lancaster Elementary School was approximately 737 students for Fall 2016. Each of the 10 Lancaster ISD campuses met standard on the 2016 State Accountability Rating System and each received at least one TEA distinction. Lancaster Elementary received

distinction designations in the areas of: ELA/Reading, Mathematics, Top 25 Percent

Student Progress, Top 25 percent Closing Performance Gaps, and Postsecondary

Readiness on the Texas Education Agency 2016 Accountability Summary (TEA

Accountability Summary, 2016). Distinction designations are awarded for achievement

in several areas and are based on performance relative to campuses of similar type, size,

grade span, and student demographics. Lancaster Elementary School's 5 TEA

distinctions out of a possible 6 exemplifies its exceptional lineage of being a leader

amongst leaders within the district.

Table 1

Lancaster Elementary School Student Demographic Information

Ethnic Distribution	School (%)	District (%)	Texas (%)
Economically Disadvantaged	89.2	86.0	58.8
African American	79.3	77.3	10.6
Hispanic	17.1	19.0	52.0
White	2.6	2.1	28.9
American Indian	0.7	0.8	0.4

One of the most critical prerequisite literacy skills for kindergarten students is the

ability to identify upper and lowercase letters with automaticity (Adams, 1990). This

initial skill is critical in the process of learning to read and is a key predictor of future

reading success (Adams, 1990; Bond & Dykstra, 1997; Chall, 1967, 1983; Lonigan, Burgess, & Anthony, 2000; National Early Literacy Panel [NELP], 2008; National Research Council, 1998; Share, Jorm, Maclean, & Matthews, 1984; Storch & Whitehurst, 2002). The Istation® Literacy Screener Letter Recognition Assessment showed 25% of Lancaster Independent School District's kindergarten students as having scored in the 20th percentile or below at the beginning of the 2016-17 school year, which signifies a tier 3 or below grade-level, in need of intensive intervention designation (Appendix A). The Letter Recognition Istation® Subtest assesses how many letters students can successfully identify in a 1-minute timeframe. Students are assessed on their knowledge of both upper and lowercase letters. Students must identify the letter symbol within a group of 5 symbols when the letter name is stated by the narrator (Mathes, Torgesen, & Herron, 2016). Istation® (aka Imagination Station) is a comprehensive e-learning program used by more than 4 million students and educators around the world (Istation Celebrating Student Success, 2014). Istation® is a computer-adaptive, research-validated assessment of early reading skills in the five key reading areas. Istation® utilizes national norms in order to compare the results of students to a nationally representative student sample based on grade level. Percentile ranks are established by utilizing the monthly overall reading ability index, as well as the ability index for each subtest (Mathes, Torgesen, & Herron, 2016). Ability indices are a measurement scale comprised of an alignment between student performance levels and test question levels of difficulty. This scale is then divided equally in order to create ability indices. Test questions are placed on the ability index based upon their level of

7

difficulty (Mathes et al., 2016). Istation® has a contract through Spring 2017 with the

Texas Education Agency (TEA) as part of the Texas SUCCESS program, a program of

the Student Success Initiative. The Texas SUCCESS program provides free and

unlimited access, both at school and at home, to Istation® Reading (grades 3-5) for all

public school students and open-enrollment charter schools in the state of Texas.

Istation® is on the Commission's list of approved assessments for K-8 English and K-3

Spanish (Istation Texas SUCCESS, 2016).

Technology is a tool utilized very readily in early childhood classrooms.

Research approximates that 98% of elementary classrooms have access to computers

with an estimated 75% of educators reporting regular classroom technology usage

(National Center for Educational Statistics, 2010). The elementary technology access

and classroom educator usage percentages in Lancaster ISD very much resemble that of

the national averages. Istation® is a type of integrated learning system (ILS) that adjusts

instruction based on individual student needs (Lee & Park, 2007). Vygotsky's social

learning theory suggests that children develop deep understandings about literacy

through social interactions with a more knowledgeable other (MKO). Istation's ability

to differentiate instruction based on each student's learning needs is not dissimilar to the

positive effect that a more knowledgeable other might have on student learning. In

traditional settings, teachers are the individuals that scaffold these interactions through

the zone of proximal development (ZPD) (Vygotsky, 1978). Vygotsky's sociocultural

theory explains that the more knowledgeable other has the opportunity to adjust the level

of support needed in order to provide optimum reinforcement based on each student's

individual performance level (Ogunnaike, 2015). The assistance of the "more knowledgeable other" provides students with the support structures to reach a greater level of academic achievement than could be achieved independently (Veraksa, Shiyan, Shiyan, Pramling, & Pramling-Samuelsson, 2016). Istation® was shown to have statistically significant effects on early literacy skills in a group of kindergarten students and was able to account for 17.7% of the variance in the group differences (Putman, 2016). Istation® was found to effectively instruct young students in certain aspects of literacy instruction, particularly those concepts that involved repetition and drill such as letter recognition (Putman, 2016). Istation® has the ability to scaffold the learning of students by providing instruction within their zone of proximal development and serve as a more knowledgeable other "between the child and the social construction of early literacy knowledge" (Putnam, 2016, p. 18). Therefore, Istation® could be considered an acceptable substitute for the more knowledgeable other (MKO) during literacy-based technology integration (Putman, 2016).

Approximately 37% of the kindergarten students at Lancaster Elementary School scored on or below the 40th percentile in the skill of letter identification based upon the beginning of year Istation® Summary Report for the 2016-17 school year (Appendix B). Students scoring between the 21st and 40th percentiles are considered at some risk and are in need of intensive intervention based on Istation®'s tier descriptions. The 40th percentile indicates that these students are performing below 60% of the students in the norm group.

9

Initial understanding. I originally framed my challenge of large percentages of

kindergarten students within my district scoring below grade level in the skill of letter

knowledge as a problem. I perceived my Record of Study theme to be a problem,

because I do not believe that there are conflicting values that would make it instead a

dilemma, or an issue that cannot actually be solved. An assumption I have is that the

students served within Lancaster ISD, who are predominantly economically

disadvantaged, are not receiving consistent academic exposure to basic foundational

kindergarten readiness skills such as practice identifying letters in the alphabet at home.

There are differences among children in their preparedness with some children entering

school with more knowledge about letters and print than others (Robins et al., 2014).

Children from low-income families are often exposed to lower levels of cognitive

stimulation at home than their more socioeconomically advantaged peers (Hart & Risley,

1995; Raikes et al., 2006). The von Stumm and Plomin study (2015) suggested that

family socioeconomic status influences children's development of intelligence from

infancy through adolescence. Children from both the highest and lowest SES

backgrounds were typically separated by an average of approximately 6 IQ points by the

age of 2 years and this gap typically tripled by the age of 16 (von Stumm & Plomin,

2015). Bradley and Corwyn (2002) speculated that children from higher SES families

often experience greater opportunities for and support in cognitive engagement and

learning than do children from more disadvantaged families. It is hypothesized that

differences in the availability of learning opportunities, support and resources are

perceived to accentuate individual differences in children's cognitive abilities (Hayes, 1962; von Stumm, 2012).

Less-fortunate children also tend to lack access to a range of material and social resources that their more affluent counterparts often benefit from (Bradley & Corwyn, 2002; Shonkoff & Phillips, 2000). Children of poverty that are most likely to experience reading difficulties in the primary grade levels are those who begin school with less prior knowledge in particular skills such as letter knowledge (Snow, Burns, & Griffin, 1998). Low socioeconomic children also tend to demonstrate weaknesses in reading-related skills such as letter recognition (Bowey, 1995; Hecht, Burgess, Torgesen, Wagner, & Rashotte, 2000; Raz & Bryant, 1990; Whitehurt & Lonigan, 1998).

Typically, families with more than one parent at home are shown to have a higher socioeconomic status, more educational resources at home (e.g., books), and more parent-time is spent with their children (Chiu & McBride-Chang, 2010). More educational resources at home and utilization of these materials foster at-home students' learning opportunities (Halle, Kurtz-Costes, & Mahoney, 1997; Horowitz, 1995). For example, single parents tend to have fewer resources and thus, lack the time and ability to provide ample at-home learning opportunities for their children; therefore, low SES children often receive less educational exposure from their parent than would typically occur in a two-parent home (Chiu & McBride-Chang, 2010).

Kieffer (2012) hypothesized that family socioeconomic status most likely has its strongest effects on grade levels most proximal to preschool such as kindergarten. Home caregivers initially have the primary responsibility of establishing language and

literacy environments during the early childhood years, then the responsibility shifts to the school (Kieffer, 2012). Children with stronger skills in letter knowledge in early childhood often outperform peers in the skill of reading (Na¨slund & Schneider, 1996). Thus, caregivers should support children's letter knowledge; particularly in the years prior to school entrance (Niklas & Schneider, 2014). These inequities may contribute to the academic discrepancies attributed to children of poverty. Therefore, caregivers may benefit from strategies and activities designed to foster the development of key literacy skills such as letter-naming, since far fewer low-SES parents engage pre-school children in these types of early learning activities (Neumann, Hood, & Neumann, 2009). Previous studies have shown that home activities which promote children's focus on letters improve their early literacy skills (Sénéchal et al., 1998; Evans et al., 2000; Hood et al., 2008; Martini and Sénéchal, 2012). However, Piasta and Wagner (2010) determined that systematic letter instruction conducted at school is more effective than parental efforts conducted at home. Therefore, teachers provide a greater benefit to students when there is a systematic focus on each student's existing alphabet knowledge (Dougherty Stahl, 2015).

The National Reading Panel report illuminates the necessity for the explicit, systematic teaching of alphabet skills such as letter-name knowledge (NICHD, 2000). Recent research that is specific to letter learning confirms this conclusion (Piasta & Wagner, 2010; Jones & Reutzel, 2012). Therefore, my Research of Study involved utilization of non-sequential letter practice with students to better solidify this skill in long-term cognitive memory banks.

Interviews were conducted in Fall 2016 with Lancaster ISD's District School Support Officer for Early Childhood Literacy, Executive Director of Academics and Innovation, Executive Director of Elementary Education, and a Campus Principal to aid understanding of both historical and current stakeholder perspectives on how letter recognition has been addressed and viewed. These conversants were asked their opinion about the effectiveness of letter knowledge instruction that has taken place within the district in the past decade. Stakeholder interviewees were also asked their thoughts about the intervention being conducted in this study. Finally, conversants were asked to explain the importance of competency in letter recognition and the effects of students entering school with low levels of letter naming exposure. The feedback obtained during the interview process confirmed the aforementioned assumptions regarding my selected problem described in Chapter III. Conversants confirmed my belief that the district focused more intensely, and there was more intentionality by district staff placed on the skill of letter knowledge specifically during the tenure of the Reading First Grant from approximately 2000 to 2010. These district stakeholder interviews also confirmed the overall belief that systematic instruction in letter knowledge is integral to individual student letter learning. Therefore, interviewees each held very similar beliefs and values regarding letter-name knowledge, there appeared not to be conflicting values. I believe that my ROS topic is a problem in need of a solution.

Relevant history of the problem. Using interview findings from key district officials collected in the Fall of 2016, interviewees seemed to consistently indicate that beginning in approximately the year 2002, the district was under the auspice of the

Reading First Grant through the Department of Education through approximately 2007.

Reading First was a $1 billion per year federal program designed to coordinate best

practices in reading instruction in US schools that served high populations of low-

income students (Snow & Matthews, 2016). During the duration of this grant in

Lancaster ISD, there were a number of proven methods of early reading instruction

implemented and mandated in classrooms based on Reading First guidelines that seemed

to have strengthened the students' overall skill level in phonological awareness,

particularly in the pre-literacy skill of letter knowledge. High quality tier one

instruction, small–group instruction, high-quality centers, differentiated instruction

based on student needs, and student grouping based on data were just a few of the best

practices utilized during the duration of the Reading First Grant. Participating districts

such as Lancaster ISD were required to adopt one of the approved reading programs

specified by Reading First, all placed significant emphasis on structured phonics

instruction and a minimum of 90 minutes of literacy instruction. Districts were then

required to invest more time teaching phonemic awareness, phonics, vocabulary,

fluency, and comprehension (Snow & Matthews, 2016). Reading First offered

participating teachers professional development opportunities focused on the five

mandated instructional practices: phonemic awareness, phonics, vocabulary, fluency and

comprehension, and offered extensive support for struggling reading students (Snow &

Matthews, 2016). However, after the life of the grant ended, so unfortunately did many

of the best practices associated with this grant due to a lack of monitoring from both

district and campus administration. Daily small-group instruction, high-quality centers,

and differentiated instruction based on individual student needs were a few of the best practices that went by the wayside. Between the years of 2007-2012, the district had a greater focus on both math and science instruction; therefore, individuals were not assigned to district-level English language arts coordinator or specialist positions. Within the 2016-17 school year, the district has begun modifying the Literacy Framework in an effort to standardize the best practices formerly utilized in reading classrooms throughout the district. It seems as though the district is moving in the right direction in terms of strengthening reading instruction by strengthening professional development offerings. The professional development sessions currently offered provide teachers with specific reading strategies to implement in order to provide consistency from campus to campus throughout the district. However, the district professional development offerings currently do not include a session similar to the one delivered to participating teachers in this study regarding non-sequential presentation of the letters. Building teacher capacity in this way should eventually result in raising student achievement and improving student learning in the area of reading.

Stakeholder groups and values. In interviews conducted in Fall 2016 with Lancaster ISD's District School Support Officer for Early Childhood Literacy, Executive Director of Academics and Innovation, Executive Director of Elementary Education, and a Campus Principal, two values dominated the discussions with these four key district stakeholders: Professional Value and Organizational Value (Cuban, 2001). Cuban (2001) explained that the problem solver must identify relevant values in a situation, identify compromises or ways in which to satisfice the situation, rank the relevant

values, and analyze the values in order to reframe the problem. Relevant value categories consist of personal, professional, organizational, and societal values that are prevalent in a situation (Cuban, 2001). The Professional values expressed were those ideals mentioned that connected to the premise of educators instructing students, while the Organization values were those beliefs connected to the practices and philosophies of the district. Surprisingly, the theme of Professional Value emerged quickly in conversations with both the principal of the campus in which my study was conducted and the district School Support Officer for Early Childhood Literacy. The Principal of the campus is abreast of individual teacher and student performance as it relates to overall best practices in reading instruction and individual letter knowledge practice. The District School Support Office for Early Childhood Literacy oversees literacy curriculum, instruction, and assessment mechanisms for PreKindergarten through Second Grades. This individual has an intimate knowledge of how literacy instruction is carried out on a daily basis across the district. Therefore, her vast understanding of the letter-naming practices for kindergarten teachers within the district from both a current and historical perspectives are key to framing the problem of this study. These two individuals share my belief that the letters of the alphabet should be presented and taught in a non-sequential manner in order to deepen students' overall cognition. Both expressed sentiments that many teachers only present the letters in a sequential manner which may be the rationale as to why many students' only seem to retain a surface-level letter-name knowledge. The letter-name cognition of these students is considered quite limited possibly due to predominantly alphabetical-order exposure. Therefore, when the

letters are provided in a randomized fashion, they seem unable to state them with fluent automaticity.

Three of the four stakeholders interviewed in Fall 2016 shared candid feelings seeming to coincide with the theme of Organizational values, those beliefs that the district is believed to hold dear. The district School Support Officer emphatically expressed her belief that students must have a strong foundation in letter-name knowledge in order to progress along the continuum toward learning to read. She also indicated that students entering school with deficits in letter-name knowledge would most likely lag behind academically when compared to their more proficient peers. The district School Support Officer and Executive Director of Academics and Innovation also shared that strengthening professional development opportunities would build teacher capacity in the areas of letter-name knowledge and by providing teachers with innovative strategies in these areas would in turn strengthen students' readiness in this critical skill. The Executive Director of Academics and Innovation is responsible for overseeing all curriculum, instruction, and assessment for all content areas for the district. Therefore, her opinions were integral to understanding the district's belief system as it relates to teaching and learning globally.

The Executive Director of Elementary Education shared her belief that the district has focused much of their efforts in the areas of math and science; therefore, inattention to key quintessential preliminary literacy skills have arisen. The Executive Director of Elementary Education oversees elementary principals and ensures that best practices considered non-negotiables by the district are being implemented and with

consistency. Her viewpoint was important to consider due in part to her daily interaction with campus leadership. She indicated during our conversations that efforts must be made to strengthen practices in paramount areas such as letter-name knowledge. She also remarked that mechanisms must be put into place in order to ensure consistency in instructional practices across all classrooms. Creating consistencies or non-negotiables will ensure that all students are taught key prerequisite skills and that all students have the same academic opportunities.

By addressing the gap that currently exists in letter-name knowledge, a number of stakeholders will benefit: students, teachers, campus-level administrators, and district-level administrators. By building teacher capacity and strengthening instructional practices in the area of letter-name knowledge, students will be more prepared to begin the journey toward becoming readers, which holds far-reaching implications. Teachers will have the ability to provide high-quality lessons and activities that fully address learning the letters of the alphabet with automaticity. Campus-level administrators will have the opportunity to level the playing field for all students and ensure that staff have the necessary pedagogical competencies. District-level administrators will have mechanisms for consistency in place that ensure fidelity in teacher instructional practices. Ultimately, student assessments will validate the consistencies in the implemented processes involving letter-name knowledge and reflect student growth in this critical preliminary literacy skill.

18

Roles and Personal Histories

My background. My experience as both an early childhood central office administrator and previously as an elementary campus-level administrator have provided me the opportunity to observe literacy instruction in a myriad of classrooms over the last decade. It is through those many observations and research that I determined not only the need for intervention in the area of letter identification, but also effective data-driven strategies to address this crucial pre-literacy skill. A sample of convenience was utilized for this study, meaning subjects were utilized that were nearest and available for participation. Two participant teachers (i.e., Medlock and Raven) partook in a professional development opportunity in order to familiarize them with the proposed treatment intervention. There were a total of three kindergarten classrooms located at Lancaster Elementary School. Medlock and Raven were selected to participate in the study; Medlock had 2 years of teaching experience and Raven had 5 years. Millner's class was selected as the control; she had 15 years of elementary teaching experience. Classroom observations were conducted to ensure that participant teachers were providing a minimum of 5 minutes of daily student practice with the serial randomized letter matrix. Assessments were administered to participant students at the beginning, middle, and end of the intervention treatment to track student progress in letter identification and to determine whether the interventions have helped to improve student achievement in letter recognition. The control students were assessed at the same time intervals in order to compare their data with that of the participant students.

19

My field-based mentor. The Executive Director of Academics and Innovation in Lancaster Independent School District was my field-based mentor throughout the life of this study. This role allows her direct oversight in the areas of curriculum, instruction, and assessment for the district. Prior to this position, she was the Director of STEM Education for Lancaster ISD and has held a number of district-level leadership positions within the last decade in and out of Lancaster ISD. She has the keen ability to easily diagnose areas in need of improvement, and the foresight to know what types of changes will positively affect student achievement. Her diverse content knowledge has introduced me to a number of avenues that have allowed me to diversify my methodologies for my Record of Study (ROS).

CHAPTER II

REVIEW OF THE LITERATURE

Theories

The first theory utilized to ground this study is that of frequency of letter exposure. This theory articulates the need to increase the exposure by which the letters of the alphabet are presented to students in order to provide students more than one instructional cycle per school year (Jones & Reutzel, 2012). The more quickly that children begin to recognize letters as units of independent importance and make the association between these symbols and their letter name, the more quickly that they made a significant stride in the acquisition of early reading (Jones & Reutzel, 2012). Increasing letter exposure and repetition attempts to rectify associations in memory (Treiman, Levin, & Kessler, 2007). The link between the shape of a letter and its name are arbitrary just like the link between an object and its label; therefore, children must be exposed to unknown letters in a repetitive manner in order to solidify the association in their memory in much the same way children are frequently exposed to the labels for concrete objects (Treiman et al., 2007). Letter instruction is often taught in an alphabetical sequence, featuring one letter at a time, completing one letter per week, until an instructional cycle is completed that encompasses all 26 letters in a school year (Justice et al., 2006; Treiman & Broderick, 1998). Traditional letter instruction featuring only one instructional cycle is problematic because a number of key studies have indicated that alphabet knowledge is one of the strongest unique predictors of a child's reading achievement (Catts, Fey, Tomblin, & Zhang, 2002; Lonigan et al., 2000; Muter,

Hulme, Snowling, & Stevenson, 2004; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004; Storch & Whitehurst, 2002). A child's learning of letter-sound correspondences has been shown to be dependent upon their knowledge of letter names (McBride-Chang, 1999; Treiman, Tincoff, Rodriguez, Mousaki, & Francis, 1998), meaning that children utilize their knowledge of letter names in order to build their knowledge of sounds (Treiman et al., 1998). Effective instruction in alphabetic knowledge should increase the frequency by which students are exposed to letters through distributed practice rather than massed instruction (Jones & Reutzel, 2012). Instruction that presents the letters at a more rapid pace than one letter per week would provide greater than one instructional cycle during a kindergarten school year; thereby, increasing the frequency of exposure to provide multiple repetitions with all of the letters of the alphabet through distributed review cycles (Jones & Reutzel, 2012). Treiman et al. (2007) concluded that memory connections in letter knowledge can only be remediated through frequency of exposure and repetition. Thus, emphasis should be placed on expanding the number of letters presented weekly in order to allow for more repetition and exposure to more letters at a more rapid pace during a school year (Jones & Reutzel, 2012).

The factors that comprise the process of letter learning are similar regardless of alphabetic language, implying a letter acquisition chronology (Helal & Weil-Barais, 2015; Treiman, Kessler, & Pollo, 2006; Treiman, Levin, & Kessler, 2007). The first step in letter identification is the ability to discriminate between similarly shaped two-dimensional symbols (Woodrome & Johnson, 2009). Children must learn to

differentiate among the letter shapes or letter naming ability will be impeded. The

chronology of letter learning is as follows: vowels are often easier to learn than

consonants, uppercase letters are often easier to write since the graphemes are

predominantly straight lines, letters that have identical upper- and lowercase are often

easier to acquire, and letters that have common shapes are easier (Helal & Weil-Barais,

2015). The process of letter learning entails acquiring the names and shapes of the

letters while letter knowledge is more comprehensive and entails the abilities to name,

recognize, provide the sound, recite, and understand alphabetic order. However, there

are four generally accepted hypotheses considered concerning the order by which young

children learn the names of the letters of the alphabet. These letter order hypotheses are

the own-name advantage, the letter-order hypothesis, letter-name pronunciation effect,

and the consonant-order hypothesis (Justice et al., 2006), which will be further described

later in this chapter.

Enhanced Alphabet Knowledge is a type of instructional method that takes the

insight gained from the implementation of each of the letter order advantages and

attempts to improve alphabetic instruction by increasing students' exposure to and

practice with letters and focuses much needed instructional time on those more difficult

to acquire letters (Jones & Reutzel, 2012). This enhanced alphabetic instruction utilizes

brief lessons taught through distributed cycles of review in order to address those letters

that are more difficult for students to learn (Jones & Reutzel, 2012). The Enhanced

Alphabet Knowledge (EAK) instructional format introduces either a new letter each day

or set of letters to students in order to provide repeated cycles of practice (Jones &

Reutzel, 2012). Jones and Reutzel (2012) concluded that the EAK Instruction was 1.5 times more effective in remediating at-risk students and 2.9 times more effective in increasing the number of students achieving benchmark requirements on the DIBELS Letter Naming Fluency subtest during the first year of their study. Therefore, this instructional design was included in order to provide a concrete example of an effective instructional strategy for letter learning that underpins the frequency of letter exposure approach. Teachers modify instruction based on students' ability to master easier to learn letters with more time spent on those more difficult to acquire letters (Jones & Reutzel, 2012).

The second theory utilized by this study to provide a foundational basis by which to ground its beliefs was that of Rapid Automatized Naming (RAN). Rapid Automatized Naming (RAN) is the ability to quickly name as many letters, digits, colors, or objects as possible in an array (Liu & Georgiou, 2017). RAN has long been established as a strong predictor of reading (Kirby, Georgio, Martinussen, & Parrila, 2010) after controlling for the effects of other key predictors of reading such as letter knowledge (Kirby, Parrila, & Pfeiffer, 2003). RAN has been described by Norton and Wolf (2012) as a microcosm of the later developing reading system, igniting many of the same processes. Liu and Georgiou's (2017) study concluded that RAN is multicomponential; meaning that phonological processing, visual processing, and articulation were all unique correlates of RAN tasks. A few studies determined the relationship between RAN and phonological awareness are stronger in the earlier development of reading and seems to decline thereafter (Georgiou, Parrila, Kirby, &

Stephenson, 2008; Parrila, Kirby, & McQuarrie, 2004); however, phonological awareness was shown to be uniquely associated with RAN in kindergarten students (Liu & Georgiou, 2017). Therefore, this study chose to utilize RAN as the mechanism by which to expose and provide repeated letter naming intervention to participant kindergarten students.

The third theory that helped to substantiate this study was research as it relates to letter learning cognitive speed. Cognitive speed is the fastest pace at which objects or symbols presented in a serial format can be named aloud (Carver & David, 2001). An example of cognitive speed would be the fastest rate at which someone could name the letters of the alphabet provided in a randomized serial pattern when the letters have been overlearned (Carver & David, 2001). RAN has long been considered one of the most competent predictors of reading ability (Boets, De Smedt, Cleuren, Vandewalle, Wouters, & Ghesquiere, 2010; Brizzolara, Chilosi, & Cipriani, 2006; Wolf, O'Rourke, Gidney, Lovett, Cirino, & Morris, 2002). One hypothesis suggests cognitive speed to be the linkage between RAN and reading ability (Kail, Hall, & Caskey, 1999). Unfortunately, there is a lack of consensus as it relates to cognitive theory and its impact on letter learning. Carver and David (2001) and Bowers (2001) speculated that letter identification ability cannot be influenced with training but only through age or maturation. However, in the Fugate (1997) study, first grade students who received letter-name training significantly improved their letter-naming speed when compared to their untrained peers. Therefore, research in cognitive speed as it relates to letter learning was included as a component of this study to explain its significance to the

25

RAN task. The treatment utilized for this study attempted to somewhat duplicate the efforts of Fugate (1997) by providing daily letter-naming training for participant kindergarten students in order to positively influence their cognitive speed.

Relevant Literature

In order to read, individuals must be able to recognize letters, understand that each letter has a sound, and be able to blend sounds in order to make words (Drouin et al., 2012). One of the prerequisite and most basic pre-literacy skills for kindergarten students is the ability to identify upper and lowercase letters with automaticity. The acquisition of this prerequisite skill is paramount to the process of learning to read. In their study, Ritchey and Speece (2006, p. 302), stated that letter name knowledge is one of the sublexical skills considered to be one of the initial building blocks for earliest efforts at decoding and spelling. Sublexical refers to skills that operate below word level (Ritchey & Speece, 2006). Early acquisition of letter identification serves as a strong predictor of reading success and a lack thereof is often indicative of future reading difficulties (Catts, Fey, Zhang, & Tomblin, 2001; McCardle, Scarborough, & Catts, 2001; O'Connor & Jenkins, 1999; Puolakanaho et al., 2007; Snow et al., 1998; Torppa, Lyytinen, Erskine, Eklund, & Lyytinen, 2010; Torppa et al., 2006). If students are unable to read fluently in the early elementary grade levels, statistics indicate they are more likely to experience significant academic difficulties throughout their educational careers which may impede their success in school and beyond. Walsh, Price, and Gillingham (1998, p. 110) indicated that "Knowledge of letter names at kindergarten entry is a strong correlate not only of later reading achievement, but of later school

achievement." However, much less is known about how letter name knowledge is best learned (Piasta, Purpura, & Wagner, 2010).

Frequency of letter exposure. Letter knowledge instruction that increases the rapidity with which letters are presented and moves through multiple instruction cycles would provide greater exposure in letter learning instruction than would one instructional cycle (Jones & Reutzel, 2012). Therefore, increasing the frequency of exposure to each of the letters to allow for more repetition through distributed cycles of review would be a preferred letter learning methodology (Jones & Reutzel, 2012). Letter learning lessons that are concise and compact presented daily, would better meet the individual needs of students since individual students have varying levels of letter knowledge (Jones & Reutzel, 2012). Students with extensive knowledge of letter names would be recommended to receive instructional cycles as needed in order to review and confirm their individualized understandings (Fielding, Kerr, & Rosier, 2007). Core literacy skills would include knowing the shapes and sounds of 12-15 letters of the alphabet. Fielding, Kerr, and Rosier (2007) indicated that kindergarten students should be able to recognize 10-15 letters and their sounds by kindergarten entry, and these targeted skills are only indicative of the 50th percentile. Students that enter school with a knowledge of the majority of the letters should receive training in the letters in which they are not yet knowledgeable in a more rapid fashion than traditional letter per week pacing (Jones & Reutzel, 2012). Students with little to no letter knowledge would need more than one instructional cycle in order to cycle through exposure to the letters with time established for review and repetition (Jones & Reutzel, 2012).

Empirical evidence concludes that frequency of exposure in conjunction with distribution of repetitive practice over time will positively impact a child's letter knowledge abilities (Justice et al., 2006; McBride-Chang, 1999). Pacing research has identified the law of 10/20 for optimal review cycle for memory set items such as letter knowledge to be transferred to long-term memory (Cepeda et al., 2009; Cepeda, Vul, Rohrer, Wixted, & Pahsler, 2008; Pashler et al., 2007; Rohrer & Pashler, 2010). The law of 10/20 indicates that for learners to commit materials to memory, review must take place between 10% and 20% of the time. For example, a school year typically consists of 180 days; therefore, distributed letter knowledge reviews should take place every 18th to 36th day, which is approximately a letter per day pacing. Adhering to this pacing example would allow the presentation of all 26 letters in approximately 5 weeks, which would provide approximately seven possible distributed review cycles during the school year. Research has concluded that students that learn letter knowledge more rapidly make greater gains in reading (Blaiklock, 2004). Therefore, letter knowledge instruction should attempt to increase the exposure to and practice with letters through concise lessons utilizing a distributed instructional design and review cycle (Jones & Reutzel, 2012).

A thorough understanding of letter-names is considered a critical kindergarten readiness skill (Lonigan, Burgess, & Anthony, 2000; Storch & Whitehurst, 2002). Most agree that alphabet knowledge is one of the most crucial skills that children learn in the early years of school (Adams, 2003). Piasta and Wagner (2010) conducted a meta-analysis of alphabet learning and instruction and concluded that traditional instructional

practices were not closing the learning gap in alphabetic knowledge for at-risk children.

Therefore, utilizing knowledge about letter-learning advantages should help eliminate

instructional deficits within the classroom and increase effectiveness in teaching letter

names (Jones & Reutzel, 2012). There are four widely undisputed letter order

advantages that lend credence to the letter-frequency theory: *own name advantage*, the

alphabetic-order advantage, *letter-name pronunciation advantage*, and the *consonant-

order advantage*. The *own-name advantage* indicates that children have a greater

knowledge of the letters that occur in their first name and the effect is strongest for the

first initial of their first name (Treiman & Broderick, 1998). Children tend to have

greater exposure to the letters in their own first name (Treiman & Broderick, 1998).

This effect has been substantiated for both kindergarten and first grade children that are

English Language Learners (Jones & Reutzel, 2012). The *alphabetic-order advantage* is

the idea that letters are frequently presented in alphabetical order in songs, children's

books, and classroom instruction; therefore, the letters at the beginning of the alphabet

generally receive the greatest amount of acknowledgement (Jones & Reutzel, 2012).

The belief is that children more readily internalize the letters that occur at the beginning

of the alphabet rather than those occurring in the middle or end because of frequency of

exposure (McBride-Chang, 1999). The *letter-name pronunciation advantage* is the

theory that children can more easily acquire the name of letters that contain their

pronunciation within the letter name (McBride-Chang, 1999; Treiman & Broderick,

1998; Treiman et al., 1998). The letters B, P, and F are examples of letters more likely

to be known than C, G, H, Q, W, or Y, which do not contain the associated sound within

29

their letter name (Justice et al., 2006; Share, 2004). Justice et al. (2006, p. 377) stated

that "the phonological composition of the letter names provides a "bootstrap" for

learning." Therefore, the phonological structure of letter names has a direct effect upon

the ease at which a child acquires the letter names (Justice et al., 2006). The *consonant-

order advantage* posits that a child's developmental milestones in phonology may

directly impact their alphabet learning (Justice et al., 2006). This means that the way in

which a child acquires individual letters of the alphabet may be influenced by the

phonological structure of their pronunciation (Justice et al., 2006). While research

contends that children learn vowel sounds much earlier in their oral language

development, typically within the first year; the acquisition of consonant sounds is much

more incremental and traditionally can occur past the first year and even stretch into

early elementary grades for more difficult to acquire sounds (Justice et al., 2006).

   Letter order advantages. The *own-name advantage* states that young children

learn those letters of the alphabet earlier that occur in their first name (Treiman &

Broderick, 1998). This theory is currently the most well-established notion on young

children's acquisition of individual letters. This development is most potent for the first

initial of a child's first name and is not applicable to last names (Treiman & Broderick,

1998). The effect has been identified in both kindergarten and first grade students to

whom English is not their first language (Treiman & Broderick, 1998) but also in

children who have the ability to speak and/or read in other alphabetic languages

(Hoorens & Todorova, 1988; Nuttin, 1985, 1987). Justice et al. (2006) concluded that

children were 1.5 times more likely to know the letters in their own first names, and 7.3

times more likely to know the first initial of their first name. The underlying premise of this finding is that children presumably observe the letters of their own name more frequently in a written format, thus providing these letters with an advantage (Justice et al., 2006).

The *alphabetic-order advantage* indicates that the letters of the alphabet positioned earlier in the alphabet string relative to those positioned later in the string are learned more readily by children (McBride-Chang, 1999). McBride-Chang (1999) established a moderate connection between a child's knowledge of specific letters and their position in the alphabet string. This determination presumably notates the increased attention to the letters of the alphabet that appear at or near the beginning of the alphabet string during direct alphabetic instruction (Justice et al., 2006). It is likely that students receive greater exposure to the letters that appear at the beginning in informal learning contexts, such as television shows, toys, parents, and games (McBride-Chang, 1999). Justice et al. (2006) determined that children were 1.02 times more likely to know a letter one position earlier in the alphabet; the letter A was 1.5 times more likely to be known than the letter Z. Similar to the own-name advantage, the premise of the *alphabetic-order advantage* is grounded in a child's exposure to specific letters of the alphabet, with particular attention influencing the order by which the letters are learned (Justice et al., 2006).

The *letter-name pronunciation advantage* posits that young children learn letters of the alphabet earlier that contain their pronunciation in the name of the letter (McBride-Chang, 1999; Treiman & Broderick, 1998; Treiman et al., 1998). The letters

31

of the alphabet that reflect their name in their pronunciation are B, P, and F implying that these letters are more easily learned by children than are those that do not such as C, G, H, Q, W, and Y. The phonological makeup of the letter names provides an aid in the process of letter learning often referred to as a "bootstrap" (Justice et al., 2006). Treiman and Broderick (1998) determined that of those letters containing their pronunciation within their names, those in which their pronunciation occurred in the onset of a consonant-vowel (CV) syllable pattern such as B, D, J, K, P, T, V, and Z were more easily acquired than those in which the letter was in the vowel-consonant (VC) syllables' code such as the letters: F, L, M, N, R, S, and X. However, the McBride-Chang (1999) study was unable to replicate the syllable pattern advantage. Justice et al. (2006) concluded that children are 1.8 times more likely to know CV-/i/ letters; however, they were unable to substantiate differences between CV-/i/, CV-/eI/, and VC letters. Their findings showed that the phonological structure of the names of letters, provide a letter learning aid for children; however, only those with a CV-/i/ syllable structure. These findings suggest that the phonological structure of letter names impact children's letter-name learning. Unlike the own-name advantage hypothesis, the letter-name pronunciation effect is connected to phonological attributes within each letter's pronunciation (Justice et al., 2006).

Lastly, the *consonant-order advantage* suggests that children first learn those letters of the alphabet corresponding to earlier-acquired consonantal English phonemes relative to letters corresponding to later learned consonantal phonemes (Sander, 1972). This effect posits that a child's phonological development may impact their alphabet

learning. This hypothesis aligns itself to research indicating that a child's letter-name knowledge is influenced by the phonological structure of their pronunciation. However, young children typically develop vowel sounds somewhat earlier in their oral language development, with mastery during the first year (Justice et al., 2006). The development of consonantal phonemes commonly occurs more incrementally and are not necessarily mastered the first year; this acquisition period may go well into elementary grade levels for those later acquired sounds. A child's development of the consonants used in oral language often follow a somewhat predictable pattern (Sander, 1972; Stoel-Gammon, 1987). Justice et al. (2006) proposed that the more frequent articulation of earlier-acquired sounds such as /m/, /b/, and /p/ may impact the strength of their "phonological representations given the integrative relationships between perceptual representations and motor-speech output in speech-sound production" (p. 378). Therefore, the letters of the alphabet that adhere to more robust phonological representations may be acquired more easily than those sounds in which the child is less experienced and are less prevalent at the phonological or perceptual level (Justice et al., 2006). This particular hypothesis lends credence to the idea that the order of letter learning is highly variable depending upon the individual among young children.

   Enhanced alphabet knowledge. Jones and Reutzel (2012) developed an innovative instructional approach that teaches a new letter each day called Enhanced Alphabet Knowledge (EAK). This approach requires teachers to introduce either a new letter or set of letters each day in multiple cycles of repeated practice. Teachers adjust instruction through pacing and frequency of exposure as easier letters are mastered.

Explicit teaching of each letter is a requirement. The letters that are more difficult for students to learn require more time, attention, and practice. Cycle one focuses on the letters in each student's name. Cycle two teaches all of the letters of the alphabet in alphabetical order and ensures that each letter is taught explicitly. During Cycle two, the teachers utilize alphabet books, songs, and games in order to explicitly teach each individual letter. Finally, Cycle three is underpinned by the letter-name pronunciation advantage. CV sounds such as b, d, j, k, p, t, v, and z are taught first and then VC sounds such as f. l, m. n, r, and s are taught last allowing for additional time to focus on more difficult to acquire letters. Jones and Reutzel (2012) concluded that EAK was shown to have increased the number of students who achieved Dynamic Indicators of Basic Early Literacy (DIBELS) Letter Naming Fluency benchmarks than those students that were taught solely in a letter-of-the-week format. Jones and Reutzel's (2012) EAK lesson presentation ranged from 10 to 12 minutes daily. Piasta et al. (2010) also introduced a new letter per day, and their lesson presentation ranged from 10 to 15 minutes daily. However, Piasta et al. (2010) concluded each week with review lessons. A child's ability to name the letters of alphabet is the strongest single predictor of their first grade reading achievement (Adams, 1990). Knowing the importance of letter naming and its linkage to future reading skills should encourage educators to consider research-based practices such as EAK that incorporate knowledge of the letter-order advantages in order to increase frequency of exposure.

  Enhanced Alphabet Knowledge (EAK) instruction is grounded in the aforementioned letter order advantages and utilizes three main components: letter-per-

day pacing, distributed review cycles, and efficient letter knowledge lessons (Jones &

Reutzel, 2012). The initial instructional cycle is completed within the first 26 days of

school utilizing a letter per day pacing. Therefore, all of the 26 letters of the alphabet are

presented during the first 5-week cycle providing the teacher sufficient time to determine

each students' individualized letter knowledge needs so subsequent instructional cycles

can vary accordingly. The teacher can present ensuing instructional cycles as needed to

best meet each student's need. Teachers can present the letters in different sequences to

best meet the needs of students based on any of the letter order advantages. More or less

time can be allocated to individual letters of the alphabet based on their acquisition

difficulty in relation to each of the letter order advantages and needs of individual

students. As students become more proficient with certain letters, more time can be

devoted to those more difficult to acquire letters. The distributed review cycles provide

the necessary repetition and frequency of exposure to aid students in letter learning.

EAK lessons are brief and explicitly provide students the necessary instruction in letter

identification and other aspects of alphabetic knowledge in order to work through a

number of distributed practices with letters (Appendix D).

     The data presented in Figure 1 represent the order by which children acquire

letter names based on average data of thousands of children obtained from two recent

studies. This figure is based on information presented in Phillips et al. (2012) and Piasta

et al. (2016). Letters that on average are more easily learned appear at the top of the

figure, while the more difficult to acquire letters are closer to the bottom of the figure.

Therefore, learning the first initial in your first name and the letter O are comparatively

easier for most children. Learning the letter name for B is a little more difficult and

typically learning the letters U and V are the most difficult for the average child.

However, letters that appear on the same line as represented in Figure 1 are on a

somewhat equitable level in terms of letter learning. Presentation of this letter

acquisition order is important to further expound upon letter nuances and how letter

knowledge instruction should not only highlight these key differences, but take into

account that these differences may require more intentionality in letter learning

instruction.

Figure 1. Typical order
in which letter names are
acquired.

Letter Names
First Initial   Easier
O

B
A
C
X
P S E H T
W M R K D
F L Y Z
G J N I Q

U
V
     More Difficult
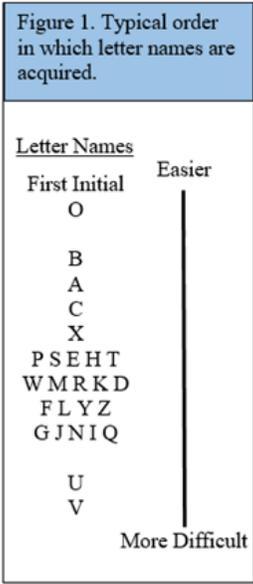
Figure 1. Typical order in which letter names are acquired. Adapted from Phillips et al.
(2012) and Piasta et al. (2016).

Table 2 depicts the diversity in which entities approach alphabetic instruction in

relevant preschool early reading curricula based on information presented by Justice et

al. (2006). Some curricula are extremely intentional in their methodology for letter

learning instruction taking into account research-based letter order advantages, while

others seem somewhat uninform, utilizing antiquated methodologies such as letter-per-

day and alphabetical order approaches (Dodge, Colker, & Heroman, 2002; Frontline

Educational Products, LLC, 2003; Hohmann & Weikart, 1995; SRA/McGraw-Hill, 2003).

Recent research adds specificity to the understanding of children's alphabetic learning;

therefore, efforts to improve both educational policy and instructional practice should be

forthcoming considering the extensive research in this area.

Table 2

Comparison of curricular approaches to teaching alphabet letters (Adapted from
Justice et al. (2006))

Preschool curriculum	Approaches
Creative curriculum (Dodge, Colker, & Heroman, 2002)	Suggests that letters be taught beginning with letters in children's names, followed by letters in words that are important to them.
Frontline phonics (Frontline Educational Products, LLC, 2003)	The five most common letters (M, A, P, S, and T) are taught first so that children can begin to sound out words before knowing the entire alphabet.
High/Scope (Hohmann & Weikart, 1995)	Letters are taught through thematic units in the following sequence: N, W, P, H, M, A, B, K, D, F, O, C, E, Y, G, T, S, R, Z. I, Q, V, L, U, J, X
Open Court Reading PreK (SRA/McGraw-Hill, 2003)	Letters are taught in alphabetical order, one letter per lesson. A review is conducted after four lessons until the alphabet is complete and then additional reviews are conducted of all alphabet letters.

Rapid automatized naming. Rapid Automatized naming (RAN) is the speed at which children can name continuously presented and highly familiar visual stimuli such as letters, digits, colors, and object (Georgiou, Parrila, & Kirby, 2006). For purposes of this study, the rapid naming of visual stimuli referenced will be letters of the alphabet. Denckla and Rudel created three versions of speeded serial naming assessments utilizing objects, letters, and numbers as the foundation. These individuals coined the term "rapid automatized naming" to delineate these tasks designed to measure the speed at which an individual can name these familiar stimuli (Denckla & Rudel, 1976b). Their studies concluded that RAN latencies were not necessarily related to how early certain items were learned, but how fluently the naming process occurred. Denckla and Rudel (1976b) found that object names were learned earlier in development, which allowed for these learning foundations providing greater automaticity later. There was much thought and consideration placed into these RAN assessment tasks. For example, they ensured that the naming task take place from left-to-right in a serial format, in order to mirror the process utilized in reading. The majority of rapid naming tests require examinees to provide the name of each individual stimuli to ensure that these items are accurately identified (Norton & Wolf, 2012). The benefits of RAN tasks are that children have the ability to perform these tasks well before they have learned to read, and RAN tasks have been correlated to reading ability in both kindergarten and beyond. RAN has been shown to be one of the strongest predictors of later reading ability with specific correlations to reading fluency (Norton & Wolf, 2012).

Most rapid automatized naming (RAN) tasks are somewhat similar to the originally developed tasks of Denckla and Rudel from over 40 years ago (Figure 2) (Norton & Wolf, 2012). Figure 2 is an example of a rapid automatized naming letters stimulus card. Denckla and Rudel's (1976b) original RAN subtests were designed with 50 items arranged in five rows of 10 items each. The RAN-RAS subtest focused on five token items for each assessment arranged in a somewhat randomized order with no item appearing consecutively on the same line (Norton & Wolf, 2012).
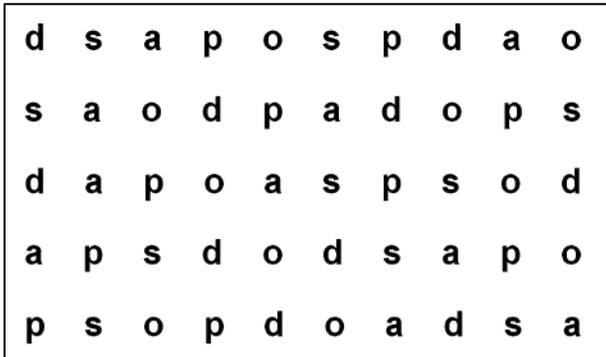
Figure 2. Rapid automatized naming letters stimulus card. Reprinted from Norton & Wolf, 2012. Rapid automatized naming (RAN) letters stimulus card, in the same format used by Denckla & Rudel (1976b) and Wolf & Denckla (2005).

Alphanumeric RAN (rapid naming of letters or numbers) has been found to be more strongly related to reading than nonalphanumeric RAN (rapid naming of objects) (Araújo, Reis, Petersson, & Faísca, 2015; Song, Georgiou, Su, & Hua, 2016) and that RAN is more strongly related with reading in the early grade levels (Araújo et al., 2015). RAN has been found to correlate strongly with both current and future fluency in reading across ages and orthographies (Kirby et al., 2010). Therefore, RAN is

39

considered a "microcosm or mini-circuit of the later-developing reading circuitry" (Norton & Wolf, 2012, p. 430). Research has concluded that RAN correlates with reading much more strongly when presented in a serial format (Bowers & Swanson, 1991; Chiappe, Stringer, Siegel, & Stanovich, 2002; Stanovich, Feeman, & Cunningham, 1983; Wolf & Bowers, 1999). Serial formatting is when all items, such as the letters in the alphabet, are printed simultaneously on a single sheet rather than discrete formatting when individual items are presented in an isolated manner (Protopapas, Altani, & Georgiou, 2013). Logan, Schatschneider, and Wagner (2011) examined the relationships between reading and naming measures in kindergarten, first grade, and second grade students. Logan et al. (2011) focused on the distinction between discrete and serial naming as they account for variance in reading accuracy. Their study found that serial naming has the ability to predict reading outcomes after controlling for discrete naming and other measures of phonological processing. The de Jong (2011) study utilized 71 first grade students and concluded that serial RAN was more strongly related to reading than was discrete RAN in first grade readers. Protopapas et al. (2013) duplicated the results of de Jong (2011) indicating that serial naming was a better predictor of both serial and discrete word reading in beginning readers.

Wolf and Bowers (1999) indicated that the ability to access and retrieve phonological representations from long-term memory is only one portion of RAN understanding and the other processes account for the individual differences in RAN to an equal degree. Articulation has been shown to account for individual differences in

RAN; however, this correlates with previous studies that showed that RAN is a stronger predictor of oral reading fluency than silent reading fluency (Georgiou, Parrila, Cui, & Papadopoulos, 2013; van den Boer, van Bergen, & de Jong, 2014). Similar studies utilized functional MRIs that showed that the RAN network involved brain regions associated with articulation (Cummine, Szepesvari, Chouinard, Hanif, & Georgious, 2014). A number of studies have denoted the conclusion that RAN is not a measure of speed of processing or short term memory (STM) (Bowey, Storey, & Ferguson, 2004; Van Den Bos, Zijlstra, & van den Broeck, 2003); however, the research of Liu and Georgiou (2017) suggested that some subprocesses (i.e., visual processing, phonological processing, and articulation) are more integral to RAN. Speed of processing is believed to account for individual differences in RAN letters (Liu & Georgiou, 2017). Vaessen, Gerretsen, and Blomert (2009) asserted that RAN tasks require the fast cross-modal matching of visual/orthographic units to phonological codes, which supports the connection between RAN and visual processing, which are believed to have a component of processing speed in it. Liu and Georgiou's (2017) findings added to previous studies that have examined the cognitive correlates of RAN by indicating that all the subprocesses incorporated in Wolf and Bowers' (1999) and Georgious's (2010) naming models including visual processing, phonological processing, semantic processing, and articulation were unique correlates of RAN.

RAN tasks have been described utilizing different terminology including but not limited to: rapid serial naming, serial visual naming, continuous rapid naming, rapid naming, and naming speed. However, this study will employ RAN involving the letters

41

of the alphabet. The implication is if a task is to be categorized as a RAN task, it will involve timed naming of familiar stimuli presented in a non-sequential order from left to right serial formatting (Norton & Wolf, 2012). One of the most widely utilized standardized assessments of RAN in the United States is the Rapid Automatized Naming-Rapid Alternating Stimulus (RAN-RAS) Tests developed by Denckla and expanded by Wolf and Denckla (2005). A child's raw score on this assessment can be utilized to produce a standard score and percentile rank. This measure is standardized and normed based on nationally representative U.S. samples. RAN-RAS tests include four subtests including: objects, colors, numbers, and letters. Each subtest has 50 items arranged in a serial format with five rows of 10 items each. The RAN-RAS test is a measure of cognitive ability (Norton & Wolf, 2012).

Cognitive speed. RAN performance is considered one of the most influential predictors of children's reading ability (Boets, De Smedt, Cleuren, Vandewalle, Wouters, & Ghesquiere, 2010; Brizzolara, Chilosi, & Cipriani, 2006; Wolf, O'Rourke, Gidney, Lovett, Cirino, & Morris, 2002). However, one hypothesis suggests that RAN is correlated to the reading process through cognitive speed of processing (Kail, Hall, & Caskey, 1999). Currently, only a few studies have examined the relationship of different subprocesses with RAN and their findings have often yielded contradictory results (Arnell, Joanisse, Klein, Busseri, & Tannock, 2009; Decker et al., 2013; Lervåg & Hulme, 2009; Närhi, Ahonen, Aro, Leppäsaari, Korhonen, Tolvanen, & Lyytinen, 2005; Savage, Pillay, & Melidona, 2007). For example, Närhi et al. (2005) found that speed of processing along with several other factors significantly predicted RAN in 8 to 11-year-

old Finnish children. However, the Decker, Roberts, and Englund (2013) study utilized a cross section of 5 to 12-year-old American children and concluded that speed of processing predicted RAN only among 7 and 11-year-old children. The differences may lie in the fact that Närhi et al. (2005) treated their sample as one group while (Decker et al., 2013) performed separate analyses for each age range. Merging different age groups may have disguised the roles the different subprocesses involved in RAN play (Liu & Georgiou, 2017). However, these studies lend credibility to the belief that RAN is only weakly related to measures of speed of processing (Georgiou et al., 2009; Swanson & Kim, 2007).

In their model of reading, Carver and David (2001) described letter-naming speed as "cognitive speed" and suggested that cognitive speed is determined by age. Carver and David (2001) posited that the speed of naming overlearned letters is likely to have a limiting influence on the normal rate of reading and is likely not to change with instruction. Their study concluded a strong correlational support consistent with the causal model indicating that low reading achievement is predicated by low rate level indicative of naming speed level. Carver and David (2001) also speculated that the improvement of letter naming abilities may only occur through age or developmental maturation. Bowers (2001) also hypothesized that one's letter identification ability may only increase through maturation.

However, the Fugate (1997) study indicated that letter naming speed did increase through training of a group of first grade children. In the Fugate (1997) study, first grade participants were subjected to flashcard drills in which 3 x 5 cards containing

43

letters were utilized. The researcher incorporated a "folding-in" technique using two

unknown letters along with 8 known letters during each session in a prescribed order.

Sessions were conducted between 10 to 15 minutes over a period of 12 days. Fugate

(1997) found that letter-naming speed increased significantly based on first grade

students' post-training assessments; however, the differences between trained and

untrained students diminished over time. The Fugate (1997) study concluded that in

order for letter speed training to be most effective, it must occur when students are just

beginning to associate letter names with sounds, which is most probable during the

second half of the kindergarten school year. Hayashi, Schmidt, and Saunders (2013)

also found that letter-identification training did positively impact letter naming which

was consistent with stimulus-equivalent studies that showed emergent naming of visual

stimuli improved through training (O'Donnell & Saunders, 2003).

Hayashi, Schmidt, and Saunders (2013) trained students in letter identification

using a computer. The virtual narrator would say the name of a letter and a black square

would appear in the middle of the computer screen. Students would then touch the black

box to reveal two to four printed letters. Correct student selections produced chimes and

praise. New letters were added within each set and this would continue until the

participant received four consecutive correct responses. Sessions were conducted one to

two times daily, 2 to 5 days per week. The narrator repeated the letter name every 2

seconds until the student selected a printed letter. The Hayashi, Schmidt, and Saunders

(2013) study concluded that the number of letters named correctly increased in 10 out of

11 cases following training. The present study utilized a serial naming letter training

that incorporated certain aspects of both the Fugate (1997) study and Hayashi, Schmidt, and Saunders (2013) study. This study utilized the letter-drilling component of the Fugate (1997) study and the computer integration of the Hayashi, Schmidt, and Saunders (2013) study. The present study provided kindergarten participant students with daily serial-formatted letter training to improve cognitive naming skills, while the Istation® Letter Recognition assessment served both as additional computer-based letter-name practice and provided rapid automatized naming assessment data at specified intervals. The data from both the Fugate (1997) and Hayashi, Schmidt, and Saunders (2013) studies indicated that training in letter naming can improve letter-naming speed in trained students and that letter-naming speed increases should positively correlate to development of some early reading skills. However, further research should be conducted in order to confirm a causal relationship better letter-naming abilities and beginning reading results. Letter training sessions often differ in length, style, and intensity but the end goal of the aforementioned studies and present study, was and is the same, to favorably influence students' letter naming abilities.

Learning objective. Communicating the student learning objective establishes a purpose for learning, motivates students, and provides a context for learning activities (Moore, 2014). Learning objectives are provided at the beginning of a lesson in order to communicate instructional intent. Students typically respond positively if they understand what it is they are expected to know or be able to do by the end of the lesson. Objectives are classified into three primary categories; however, for purposes of this study, cognitive (thinking) is the category most relevant to this study's intervention.

Cognitive objectives involve student recall or recognition of information such as learning the letters of the alphabet (Moore, 2014).

During each intervention session, participant teachers were asked to commence each intervention session by articulating the learning objective to students for a 1-minute timeframe. A teacher objective script was provided to participant teachers to furnish them with an example dialogue of what to share with students daily prior to beginning the intervention (Appendix H). Teachers were told that the script did not have to be read verbatim; however, the expectation was that students would be provided a daily reminder of the learning objective for this intervention, which was for students to learn the letter names with automaticity in order to one day become fluent readers.

Istation®. Istation® Early Reading system is a web-based Computer Adaptive Testing (CAT) system that provides Continuous Progress Monitoring (CPM) by consistently assessing and reporting students' ability in the key reading domains during an academic school year (Mathes et al., 2016). Istation® utilizes CAT based technology in order to adjust assessments to the individual ability level of each child based on their assessment performance (Mathes et al., 2016). Istation's Early Reading system provides student growth information in five key reading domains: phonemic awareness, alphabetic knowledge and skills, fluency, vocabulary, and comprehension (Mathes et al., 2016). However, for purposes of this study, Istation's Letter Knowledge subtest was utilized to assess participant kindergarten students at three intervals: before, during, and after the intervention implementation. Istation® was selected as the assessment

mechanism for this study because the students of Lancaster ISD were already familiar with this program as it is the district's adopted literacy assessment screener.

Istation® Early Reading utilizes a game-like computer adaptive testing (CAT) format in order to assess students on a number of key development reading measures. CAT assessments are often referred to as "tailored tests" because the computer selects items based on individual student performance, tailoring the assessments in order to measure student performance abilities (Mathes et al., 2016). The computer selects easier items if the previous items are missed and more difficult items if the student is able to answer correctly. Therefore, it is through this process that the computer is able to generate "probes" with higher reliability than those assessments with alternate formats and these CAT measures are a better reflection of a student's true ability.

This study will assess participant kindergarten students utilizing Istation's Letter Knowledge subtest as a measure of individual student ability in the area of Letter Naming. Istation® is an assessment mechanism already utilized by Lancaster ISD in grades PreKindergarten through 8th Grades to measure individual student ability in critical domains of reading. Istation® assesses kindergarten students on letter knowledge represented by the most basic level of phonics knowledge, which requires students to know the name of a letter represented by the letter of the alphabet. The Istation® letter recognition assessment measures how many letters that a student can correctly identify in a one-minute timeframe (Mathes et al., 2016). Students are presented with a combination of five uppercase and lowercase letters that appear on the

47

screen in a serial format. The student is asked to identify the letter symbol for the letter

name that the narrator orally produced (Appendix C).

     Home connection. The National Center for Education Statistics (2017) indicated

that in the year 2015, student performance in reading showed approximately 69% of

national 4th grade students scoring "below proficient" in basic foundational reading

skills. Furthermore, this data specifically indicated low reading performance for

children of color and low-income children. In order to remediate weaknesses in reading,

focus must be placed on early identification of children that could potentially be at-risk

for these reading deficiencies possibly even before they enter school. Growing evidence

suggests that skills in the early grade levels have a direct effect on the development of

elementary school proficiencies (Molfese et al., 2006). Molfese et al. (2006) indicated

that only 66% of children entering kindergarten could name all upper and lowercase

letters of the alphabet. Children proficient in letter name identification, as indicated by

quartile scores, showed stronger skills at the end of kindergarten and into first grade on

measures of phonological processing and word reading compared to their less proficient

counterparts (Molfese et al., 2006). Letter identification skills have been consistently

identified as the most basic foundational skill correlated to the development of reading

(Adams, 1990). Fluency in letter naming has been specifically linked to later reading

abilities (Badian, 1995; Walsh, Price, & Gillingham, 1988). Children from low-income

families often entered school with fewer letter-naming abilities, putting them at greater

risk for low achievement in reading (Duncan et al., 1998; McLoyd, 1998; Arnold &

Doctoroff, 2003; Ryan et al., 2006).

Large percentages of kindergarten students enter school without familiarity to basic pre-academic skills, such as exposure to the alphabet, that are integral to early literacy foundations. Many studies validate the importance of at-home pre-academic experiences in providing a foundation for children's literacy development prior to entering school (Adams, 1990; Foulin, 2005; Levin, Shatil-Carmon, & Asif-Rave, 2006; McBride-Chang, 1999). Senechal's Home Literacy Model identifies two types of home activities that best promote students' school readiness (Senechal 2006, 2010; Senechal & LeFevre, 2002). The first involves a focus on the meaning of the print and the other involves direct attention to the print (Senechal 2006, 2010; Senechal & LeFevre, 2002). A growing body of research also indicates that socioeconomic status plays a direct role in a child's letter naming abilities in kindergarten likely due in part to a lack of intentionality in teaching the letters prior to entrance into school (Bowey, 1995; Chaney, 1994; Duncan & Seymour, 2000; Korat, 2005; Lonigan, 2003, 2004). Molfese et al. (2006) determined that students that entered kindergarten already proficient in identifying the letters showed stronger skills at the end of kindergarten and into first grade on phonological processing and word reading measures than did their less proficient counterparts.

Most Significant Research and Practice Studies

Adams, M. J. (1990). Beginning to read: Thinking and learning about print. Cambridge: MA: MIT Press.

Blaiklock, K. E. (2004). The importance of letter knowledge in the relationship between phonological awareness and reading. *Journal of Research in Reading*, *27*(1), 36–57.

Bond, G. L. & Dykstra, R. (1997). The cooperative research program in first-grade reading instruction. *Reading Research Quarterly, 32, 345-427.*

Chall, J. S. (1967). Learning to read: The great debate; an inquiry into the science, art, and ideology of old and new methods of teaching children to read, 1910-1965. New York, NY: McGraw-Hill.

de Jong, P. F. (2011). What discrete and serial rapid automatized naming can reveal about reading. Scientific Studies of Reading, 15, 314–337.

Dougherty Shahl, K. A. (2015). New insights about letter learning. *The Reading Teacher*, 68 (4), 261-265.

Evans, M., Bell, M., Shaw, D., Moretti, S., & Page, J. (2006). Letter names, letter sounds, and phonological awareness: An examination of kindergarten children across letters and of letters across children. *Reading and Writing*, 19 (9), 959-989. doi: 10.1007/s11145-006- 9026

Fielding, L., Kerr, N., & Rosier, P. (2007). *Annual growth for all students, catch-up growth for those who are behind.* Kennewick, WA: New Foundation Press.

Fugate, M. H. (1997). Letter training and its effect on the development of beginning reading skills. *School Psychology Quarterly*, 12, 170-192.

Helal, S., & Weil-Barais, A. (2015). Cognitive determinants of early letter knowledge. *European Early Childhood Education Research Journal*, *23* (1), 86-98.

Huang, F. L., Tortorelli, L. S., & Invernizzi, M. A. (2014). An investigation of factors associated with letter-sound knowledge at kindergarten entry. *Early Childhood Research Quarterly*, 29 (2), 182-192. doi: 10.1016/jecresq.2014.02.001

Jones, C. D. & Reutzel, D. R. (2012). Enhanced alphabet knowledge instruction: Exploring a change of frequency, focus and distributed cycles of review. *Reading Psychology*, *33* (5), 448–464. doi: 10.1080/02702711.2010.545260

Justice, L. M., Pence, K., Bowles, R. B., & Wiggins, A. (2006). An investigation of four hypotheses concerning the order by which 4-year-old children learn the alphabet letters. *Early Childhood Research Quarterly*, 21 (3), 374-389. doi:10.1016/j.ecresq.2006.07.010

Kirby, J. R., Georgiou, G. K., Martinussen, R., & Parrila, R. (2010). Naming speed and reading: From prediction to instruction. Reading Research Quarterly, 45, 341–362.

Logan, J. A. R., Schatschneider, C., & Wagner, R. K. (2011). Rapid serial naming and reading ability: The role of lexical access. Reading and Writing, 24, 1–25.

Lonigan, C. J., Burgess, S. R., & Anthony, J. L. (2000). Development of emergency literacy and early reading skills in preschool children: Evidence from a latent-variable longitudinal study. *Developmental Psychology*, 36, 613-696.

McBride-Chang, C. (1999). The abcs of the abcs: The development of letter-name and letter-sound knowledge. *Merrill-Palmer Quarterly*, 45 (2), 285-308.

National Early Literacy Panel. (2008). Developing early literacy: Report of the national early literacy panel. Washington, DC: National Institute for Literacy. Retrieved from http://www.nifl.gov/earlychildhood/NELP/NELPreport.html

National Research Council. (1998). Preventing reading difficulties in young children. Washington, DC: National Academy Press.

Norton, E. S. & Wolf, M. (2012). Rapid automatized naming (RAN) and reading fluency: Implications for understanding and treatment of reading disabilities. Annual Reviews of Psychology, 63, 427–453.

Piasta, S. B., Purpura, D. J., & Wagner, R. K. (2010). Fostering alphabet knowledge development: A comparison of two instructional approaches. *Reading and Writing, 23*, 607–626.

Piasta, S. B. & Wagner, R. K. (2010). Developing early literacy skills: A meta-analysis of alphabet learning and instruction. *Reading Research Quarterly*, 45 (1), 8-38. doi: 10.1598/RRQ.45.1.2

Protopapas, A., Altani, A., & Georgiou, G. K. (2013). Development of serial processing in reading and rapid naming. *Journal of Experimental Child Psychology*, *116*914-929. doi:10.1016/j.jecp.2013.08.004

Ritchey, K. D., & Speece, D. L. (2006). From letter names to word reading: The nascent role of sublexical fluency. *Contemporary Educational Psychology*, 31, 301-327. doi:10.1016/j.cedpsych.2005.10.001

Share, D. L., Jorm, A. F., Maclean, R., & Matthews, R. (1984). Sources of individual differences in reading acquisition. *Journal of Educational Psychology*, 76, 1309-1324.

Storch, S. A. & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology*, 38, 937-947. doi:10.1037//0012-1649.38.6.934

Treiman, R. & Broderick, V. (1998). What's in a name? Children's knowledge about the letters in their own names. *Journal of Experimental Child Psychology*, *70*, 97–116.

Treiman, R., Levin, I., & Kessler, B. (2007). Learning of letter names follows similar principles across languages: Evidence from hebrew. Journal of Experimental Child Psychology, 70, 97–116.

Significance of the Literature Review

The review of the literature provided the framework upon which the study was based and supplied the background knowledge needed to formulate an initial hypothesis. Can the percentage of kindergarten students score on grade level in letter identification increase significantly with consistent daily non-sequential upper and lowercase letter practice when compared to a control group with traditional curriculum? Utilizing interconnected subject matter allowed the global references to provide a broad depiction upon which a solution was formulated. When contemplating the solution, consideration had to be given to a number of integral studies that assisted in development of an intervention to address letter-learning deficits in kindergarten students.

CHAPTER III

FRAMING THE PROBLEM

The Problem Situation

Learning more. Fall 2016 interviews were conducted with Lancaster ISD's District School Support Officer for Early Childhood Literacy, Executive Director of Academics and Innovation, Executive Director of Elementary Education, and a Campus Principal to provide perspectives on how letter recognition has been addressed and understood in Lancaster ISD. In-person interviews, with the aforementioned administrators, took place at Lancaster Elementary School, the site of this study's intervention location. Interview times were between 30 to 45 minutes in length. Conversants were asked the same set of questions and were told to answer candidly based upon their understanding of historical district perceptions or their professional knowledge as it relates to this pre-literacy skill, alphabet acquisition. The purpose of the interviews was to gather specific context-related data from key district stakeholders that have an intimate knowledge of letter learning in Lancaster ISD and a broad professional knowledge of letter learning as it relates to education in general and each were asked the same set of questions. The list of interview questions are found in Appendix E. These district-level interviewees (will also be referred to as conversants and/or stakeholders in this study) were asked to express their sentiments about the effectiveness of letter knowledge instruction as it relates to historical practice within the district and the effectiveness of these previous attempts. Conversants were also asked to provide insight regarding the intervention conducted for this study. Lastly, they were asked to explain

the importance of competency in letter recognition and the effects of low-SES students entering school with perceived underdeveloped skills in letter naming.

Problem or dilemma. Problems have the ability to be solved, whereas dilemmas cannot and require satisficing. Dilemmas are messy and are often composed of competing values (Cuban, 2001). The district's kindergarten deficit in the pre-literacy skill of letter-name knowledge is a problem that hypothetically can be solved as evidenced by the district successes in this alphabetic skill, during the life of the Reading First Grant from 2000 to 2010. Based on key stakeholder responses, they believed the solution to this solvable problem related to the professional value of order. The stakeholders indicated that throughout the district, many instructors are only teaching the alphabet in alphabetical sequence; therefore, students are only superficially memorizing the letters. This critical alphabetic knowledge is not stored in long-term memory, which can lead to the letters being forgotten over time (Treiman, Levin, & Kessler, 2007). The solution to the problem based on the feedback of key stakeholders is daily non-sequential letter practice as an intervention for addressing this deficit. This proposed solution also falls under the professional value of order.

My Journey in the Problem Space

Considering alternative viewpoints. A number of key stakeholders indicated their belief that the deficit in letter knowledge may stem from a lack of instructional consistency from teacher to teacher and also a lack of administrative monitoring of these practices. Several stakeholders specifically mentioned a grant, called Reading First, that was in effect from approximately the year 2000 through 2010. During the life of this

grant, the district was said to have experienced academic success in the areas of early

reading. The Reading First Grant was created in conjunction with the No Child Left

Behind (NCLB) Act of 2001 in an effort to enhance teacher practices, instructional

content, and classroom environments in early childhood classrooms and to help ensure

that young children start school with the skills needed for academic success. Funding

for this grant was provided to districts such as Lancaster ISD with high percentages of

low-income students to support age-appropriate development of children's language and

literacy skills. The grant targeted key pre-literacy skills such as oral language,

phonological awareness, awareness of print conventions, and alphabet knowledge. The

two key components of the grant were scientifically based methods designed to target

the key pre-literacy skills and targeted intentional professional development

opportunities for early childhood teachers. After the grant ended, key stakeholders

indicated that so did many of the research-based practices associated with previous

success in pre-literacy such as daily small-group instruction, high-quality centers, and

differentiated instructional based on individual student needs; therefore, a decline in

student scores associated with letter knowledge have occurred in recent years across the

district. One of the key reasons that several of the best practices diminished was due to a

lack of intentional monitoring systems. Interviewees mentioned that the district did not

assign individuals to monitor the previously required best practices that had been a part

of Reading First; therefore, practices began to wane.

There are number of steps that should be taken to ensure the longevity of this

study's intervention, if it were to be adopted by Lancaster ISD or any other district or

entity. One of the keys to sustainability is ensuring that teachers know the "why" behind

what they are being asked to implement. By providing teachers with professional

development opportunities designed to provide the research behind the importance of

letter naming fluency and guaranteeing ample opportunity for modeling and practices,

teachers will feel much more comfortable and confident in executing a daily classroom

intervention with their students that they have intimate understanding of.   The goal of

professional development is to transfer new learning from theory to teacher application

(Coskie & Place, 2008). Effective professional development instruction attempts to

balance knowledge and strategies in such a way that learning and application of that

knowledge increases (Wilson, Grisham, & Smetana, 2009). Ideally, professional

development sessions utilizes "theory, demonstration, and opportunities for practice" in

order to effectively connect theory to practice (Wilson, Grisham, & Smetana, 2009, p.

709). The district would need to provide participant teachers the materials (weekly

randomized serial matrices) needed each school year to ensure the intervention is

undertaken. The weekly serial matrices were printed 18" x 24" inch poster-size with 30-

point letter font size. Then by having campus principals incorporate the intervention

into each participant teacher's daily Reading time block through the campus master

schedule, teachers are more likely to commit to a practice that is specifically designated

on their daily teaching schedule. Finally, this type of intervention required a campus-

based monitoring system in which campus-level administration is consistently

monitoring the daily classroom level implementation. These steps were necessary to

help ensure the success of this study's letter learning intervention strategy and to provide a plan to best support sustainability.

   The evolution of my current understanding. Through extensive literature review and countless conversations with a number of key district stakeholders, my understanding and perspective of this problem have expanded significantly to incorporate the ideals of those that I have had the opportunity to converse with. I am confident that I now have a more thorough and in-depth viewpoint. Becoming familiar with the most updated literature related to letter learning and my understanding of the context and previous practices, have broadened my knowledge to facilitate making informed-based decisions regarding the professional development to both enhance letter knowledge practices within my district as well as educate instructors on this critical pre-literacy skill.

CHAPTER IV

PROBLEM STATEMENT

Audience

This Record of Study is directed at early childhood educators, elementary administrators, and researchers. Campus stakeholders must make critical decisions regarding instructional practice that is both targeted and proven effective. By utilizing the results of this study, stakeholders will be prepared to make data-driven instructional treatment decisions for students in the area of letter-name knowledge. By focusing instructional efforts on this sublexical skill, theoretically, kindergarten students will have a stronger foundation in letter-name knowledge to aid them on their journey toward becoming fluent readers.

Ideal Scenario/Vision

In order to ensure kindergarten students' mastery of the pre-literacy skill of letter recognition, kindergarten classrooms must provide explicit instructional practices geared toward significantly improving students' alphabetic automaticity (Jones & Reutzel, 2012). Practices designed to combat historical student academic deficits in the area of letter recognition must include a teacher training component designed to build capacity in this crucial prerequisite skill as well as provide activities/interventions to incorporate daily non-sequential automaticity with letters (Jones & Reutzel, 2012). However, early childhood educators must ascertain not only the importance of early acquisition of this skill in order to combat potential future deficits in reading fluency but also should

designate instructional time to consistently address this critical prerequisite skill with students.

The Real

Antiquated instructional methodologies still exist in many kindergarten classrooms. Teachers often rely too heavily on singing the sequential alphabet song as the primary strategy for improving student cognition (Ellefson, Treiman, & Kessler, 2009). Students must be provided daily non-sequential letter interventions in order to increase letter naming fluency, cognition, and speed. Therefore, the key to elimination of this deficit lies in integration of explicit randomized letter practices into the daily reading schedule. However, teachers predominantly indicate that a 120 minute reading language arts block is at capacity; therefore, schedule organization in order to ensure sufficient time is allotted to address this deficit is paramount. Students must be provided ample time in order to move letter learning from short-term to long-term memory banks and have the ability to transfer this knowledge into practice and significantly increase automaticity.

Consequences for the Audience

Early acquisition of letter identification serves as a strong predictor of reading success and later deficits are often a key indicator of future reading difficulties (Catts, Fey, Zhang, & Tomblin, 2001; McCardle, Scarborough, & Catts, 2001; O'Connor & Jenkins, 1999; Puolakanaho et al., 2007; Snow et al., 1998; Torppa, Lyytinen, Erskine, Eklund, & Lyytinen, 2010; Torppa et al., 2006). If students are unable to read fluently in the early elementary grade levels, statistics indicate they are more likely to experience

significant academic difficulties throughout their educational careers, which may impede

their future success in both academia and postsecondary (Cunningham & Stanovich,

1997). There is simplicity in the fact that the solution to alleviating pre-literacy deficits

lie in a students' mastery of the letters and their names.

By implementing daily non-sequential letter naming practices into classroom

schedules, the opportunity to accelerate the process involved in students' acquisition of

reading is significantly increased (Jones & Reutzel, 2012). These letter-naming

interventions have the potential to lessen and potentially eliminate academic deficits,

thus decreasing the possibilities of later reading difficulties, which may become an

insurmountable obstacle. The more quickly students are able to become fluent readers,

the greater their capacity to acquire new learning and the more academically prepared

they have the propensity to become in the future.

My Role

My role consisted of providing the two participant kindergarten teachers with an

initial professional development opportunity to familiarize them with the proposed

treatment intervention. There was one kindergarten teacher that was utilized as the

control for the study, who did not participate in the professional development session

related to the study nor did her students participate in the study's daily alphabet

intervention. The control teacher continued to follow the district's adopted curriculum,

as did the participant teachers; however, the control teacher addressed letter knowledge

utilizing traditional instructional practices as needed. A control teacher was utilized in

order to have the ability to compare similar instructional environments with kindergarten

children that were not exposed to daily non-sequential letter practice with a group of children that were trained in daily letter fluency. The professional development session provided the two participant kindergarten teachers with the weekly randomized rapid letter naming matrices, educated them on the critical nature of this sublexical skill, and modeled how to utilize the intervention with students. Participant teachers implemented the targeted letter knowledge practice daily into their daily reading schedule and were observed weekly for a 10-week period to ensure that the treatment was delivered to students for the required 5-minute timeframe daily. Participant teachers also continued to integrate the district's adopted curriculum and lessons related to letter knowledge as suggested by the curriculum's instructional pacing guide.

CHAPTER V

THE SOLUTION

The Solution

In order to attempt to tackle this letter knowledge deficit, parents must be made aware of the crucial nature of letter-naming and how this skill is the first hurdle in the process of learning to read. By educating parents on the requisite nature of this skill, then parents better understand the necessity of preparing their students both inside and outside of the classroom. The possible solution would be to provide parent development sessions prior or near the beginning of the kindergarten school year to both inform parents and provide training activities and strategies on how to address letter-name knowledge at home. Sessions could entail providing parents with activities geared toward assisting students in honing their letter-name knowledge. Activities could include non-sequential letter matrices, such as the ones utilized for this study. The parent engagement sessions could allow for teacher modeling and parent practice to ensure their comfort with the letter-naming activities.

Favorable outcome. By educating parents on the need for letter-naming fluency, allowing more at-home focus efforts, and parent responsibility for fluency in this skill, teachers may have the necessary support mechanisms in place to move more swiftly through the letter learning instructional cycle, thus regaining valuable instructional time, since more students should hypothetically be more fluent with the letters and their names. Students with more mastery of letter names should provide instructors more time for repetition with either new letters or sets of letters. Teachers

would have the opportunity to focus more time and effort on those more difficult to acquire letters versus having to teach every letter to every child. Making parents aware and responsible for their child's learning may be a critical component in potentially alleviating this deficit for kindergarten students.

Data collection methods. In order to determine the effectiveness of this possible solution, Istation® could be utilized as the student assessment mechanism, just as was done in the present study. Letter knowledge results for Istation® could be analyzed to determine the validity of this solution of both educating and empowering parents to participate in the growth of their child's letter-naming abilities. Istation® results could be compared, as was done in this study, at different intervals in the school year to determine student growth in the area of letter-name knowledge when compared to a control group that did not undertake parent training efforts. The data analysis could provide a snapshot in order to determine the implication for this type of parent involvement endeavor.

Input from Others

The Executive Director of Elementary School and District Support Officer for Early Childhood Literacy are key literacy stakeholders within the district and through interview conversations collectively indicated their cognizance of the kindergarten letter knowledge deficiency. Each expressed the need for kindergarten teachers to utilize explicit letter naming interventions to combat the acknowledged deficit. Each of these central office administrators supported my proposed solution for attempting to diminish

the kindergarten deficiency in the area of letter recognition by implementing daily non-sequential letter identification practice in each kindergarten classroom.

Each administrator referenced the need to utilize a technique or strategy that was both explicit in nature and combatted the summer academic regression that many students, particularly those of low socioeconomics, experience when they have little to no academic exposure for an extended period of time such as limited practice with print and a lack of access to books. Over three decades of educational research has correlated the effects of summer vacations on the academic progress of low-income children (Alexander & Entwisle, 1996; Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996; Entwisle & Alexander, 1992, 1996; Heyns, 1978). Their combined research specifically speaks to the out-of-school summer learning rates experienced by disadvantaged students, which tend to be remarkably slower than the growth rates of their more affluent counterparts. Alexander, Entwisle, and Olsen (2007) concluded that the summer learning loss experienced in the first five years of schooling experienced by low-SES students accounted for over half of the achievement gap difference by the time that these students reached high school. Children of low socioeconomic status can fall behind as much as three months in reading compared to middle class children during the summer months (von Drehle, 2010). Cooper, Nye, Charlton, Lindsay, and Greathouse (1996) indicated that substantial differences in reading achievement between middle-class and at-risk children likely exist because low-income children have less access to books and reading opportunities than their more affluent counterparts.

65

When the proposed solution was discussed with conversants, each agreed that this type of daily intervention would most likely alleviate significant academic gaps in this skill area. Each stakeholder agreed to the necessity of creating strategies to utilize district-wide to ensure consistency and uniformity in instructional delivery, particularly in the area of letter knowledge. Therefore, each mentioned the need to incorporate the proposed intervention solution into the district's Literacy Framework to ensure teachers are not only aware of the academic benefits of a randomized letter knowledge intervention but understand the district's directive for implementation. Having this solution incorporated into the district Literacy Framework will be the first step in attempting to ameliorate letter knowledge practice within the district.

Classmates' input. The input of my classmates was extremely valuable in the creation of the intervention utilized for this study. Their varying levels of experience provided a depth of insight that could only be gained from vastly divergent backgrounds and instructional philosophies. The suggestions provided by my classmates led to the creation of the non-sequential concept that was utilized as the daily intervention for this study. My classmates also provided a number of additional strategies geared towards practicing these letter-learning competencies as a type of nightly homework exercise. While I agree that these skills can be more readily mastered through at-home practice, I believe that these types of strategies would best be utilized in conjunction with the daily non-sequential letter fluency intervention strategy. Lancaster ISD has labored, over the years, to implement effective family engagement initiatives geared toward alleviating academic deficits, specifically in the area of literacy. There have been a number of

family engagement initiatives including but not limited to Parent Connect sessions, which provide training for parents so they can better assist students with their academics and social support behaviors. Strengthening families was another Lancaster ISD family engagement initiative that intended to utilize Practical Parent Education curriculum to teach parenting skills in a way that promoted the maintenance of healthy relationships between parents and their children while empowering parents to take an active role in their child's education. Sessions were formatted in a manner that encouraged parents to collaborate with school personnel to gain insight on effective strategies that support communication skills, positive behavior supports, academic motivation, and an emphasis on prevention. These family engagement strategies have often been met with a lack of support; therefore, there has been an inability to sustain these initiatives with the parents and guardians of the community. Lancaster ISD has struggled throughout the years in implementation of at-home practice methodologies that are consistently utilized by parents and guardians. Family Engagement opportunities would be a great mechanism in which to both train and enlighten parents and guardians of the importance of learning letters and how this skill is a precursory step in the acquisition of reading.

Field supervisor's input. The Executive Director of Academics and Innovation, during our interviews, gave credence to many of the best practices that are currently being leveraged in kindergarten classrooms across the district to promote awareness in the area of letter knowledge. However, she remarked that strategies such as my intervention should most likely be implemented earlier than the kindergarten school year and as previous stakeholders concurred should be implemented consistently in all

kindergarten classrooms. The field supervisor agreed that non-sequential daily practice

with letter identification interventions could strengthen students' alphabetic knowledge

when used as one of the strategies for letter acquisition. My field supervisor also

stressed the importance of not only building teacher toolboxes with research-based

strategies but also building teacher capacity in sound pedagogical practice. She reflected

that teachers must have a thorough content knowledge in order to make sound

instructional decisions that will positively impact student achievement. Therefore, the

initial intervention training session provided in February of 2017 not only trained the

two participant kindergarten teachers on how to implement the proposed strategy but

provided them with an instructional goal and background for the intervention and helped

to eliminate potential uncertainty regarding the validity of the intervention.

Solution/Intervention

   Informing the solution. After extensive conversations with key stakeholders,

classmates, and my field supervisor, I felt that I had a much better understanding of my

problem and how to address this deficit in letter-naming. It seemed logical to

incorporate the philosophy that was mentioned by several interviewees involving a type

of randomized letter presentation to address letter-name knowledge gaps. The

methodology being suggested was different from the strategies currently being utilized

in kindergarten classrooms throughout the district. The district simply could not

continue the status quo based on their deficits in this area. Istation® was already being

utilized as the district's literacy screener; therefore, continuing to use this computer

adaptive testing system, as part of the study, would provide reliable consistent

comparison data in order to substantiate student growth in this area. Also, the district would be more inclined to consider the results of this study, if Istation® was the data collection mechanism, due to their belief in the reliability of this assessment software.

Lancaster ISD has struggled historically to gain traction in the parent participation realm. There have been a number of unsuccessful initiatives aimed at providing professional development opportunities for parents. The goal of these parent initiatives was to positively impact academics within the district; however, these all floundered and eventually failed due to a variety of reasons. Even though it seemed reasonable to consider a parent education/engagement component as part of this study due to the potential for positive outcomes, I opted not to include a parent education/engagement option for fear of the same sustainability obstacles that the district encountered in its previous attempts. Therefore, a parent component was not included as part of this study.

The final solution. The problem. Student automaticity in letter-name knowledge is a foundational and prerequisite step in the process of a child learning to read. Kindergarten students in Lancaster ISD have historically scored poorly on assessments that track letter-name knowledge. Therefore, kindergarten teachers often spend excessive amounts of instructional time attempting to remediate student deficits in this area. Teachers are unable to move students to the next steps in the process of learning to read because of the severe deficiencies that children have shown. Teachers need to be able to regain valuable instructional time.

The solution. A letter-naming intervention strategy designed to address this skill gap is necessary and crucial to more readily preparing students for the task of learning to read. Therefore, creation of an easy to implement randomized letter practice was a necessity. Through my research, the intervention solution became a non-sequential serially formatted letter matrix designed to promote letter learning.

Favorable outcomes. Addressing this academic deficiency with daily randomized letter repetitions would increase the frequency of letter exposure and provide multiple repetitions with all of the letters particularly letters that have been shown to be more difficult to learn. Multiple repetitions allow teachers to move through numerous instructional cycles as opposed to one traditional letter cycle that takes an entire school year in order to teach all of the letters of the alphabet once and helps remediate students' letter-naming memory connections.

Data collection method. The final solution was to continue with Istation® as the assessment mode of data collection for letter-naming. The belief was that the district would be more apt to consider the merits of a letter-naming intervention if they could compare the results using an assessment mechanism that they felt comfortable with and believed in.

CHAPTER VI

METHODS

Overview

Figure 3 was created to provide a visual representation of the key components for

this study. The figure displays the primary premise for the study, which is the

intervention designed to improve letter-name knowledge skills. The figure then denotes

the number of walkthroughs that each individual participant teacher received over the

10-week period as well as the number of Istation® assessment data collection points.

Finally, the diagram indicated the initial professional development session that both

participants attended and the randomized letter matrices that each participant teacher

received for the intervention cycle.
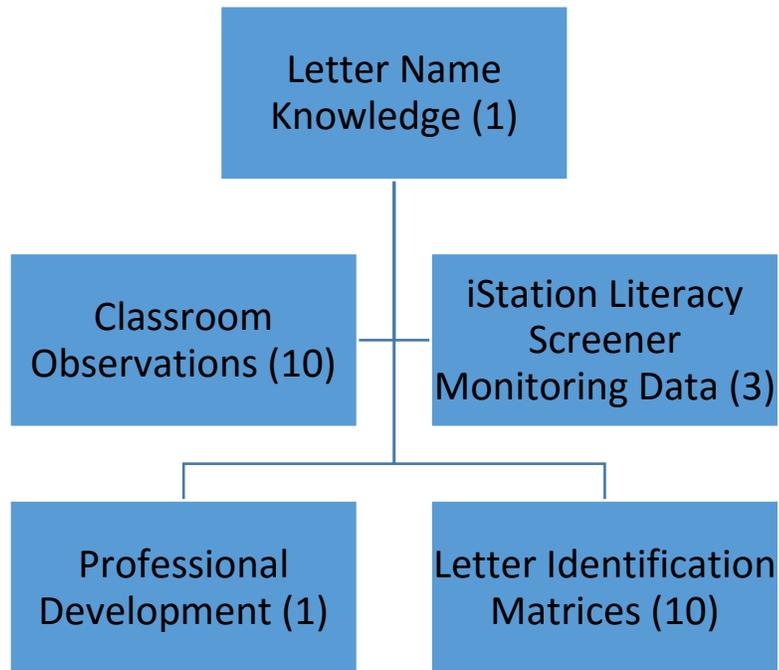
Figure 3. Overview of the study. This figure is an overview of the main components utilized for this study.

This mixed methods study addresses the problem of kindergarten students' low performance on the task of correctly identifying letters of the alphabet. This skill is critical in the process of learning to read and is a key predictor of future reading success. In this study, classroom observations were conducted weekly with the two participant kindergarten teachers during the 10-week treatment period. Observations were utilized to determine intervention consistency and to ensure fidelity in the implementation of the treatment. Fidelity entailed participant teachers adhering to the 5-minute time requirement for the intervention. The Istation® Literacy Screener was administered to kindergarten students at the beginning, middle, and end of the treatment to track student progress in the area of letter-name knowledge. The 2 participant kindergarten teachers

received an initial professional development opportunity to instruct them on proper implementation of the intervention.

Medlock and Raven participated in the professional development session together. Professional development has been defined as a combination of "processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (Guskey, 2000, p. 16). Therefore, the goal of this training was to fill the gap between what the participant teachers knew and what they needed to know. The training design provided the instructional objective for conducting this study, a thorough overview of the intervention, and explicit modeling designed to provide systematic intervention expectations. The session was approximately 2 hours in length and transpired at the end of a school day in early February 2017. The session began with an overview on the importance of student automaticity in letter naming so that the two teachers would understand the importance of this prerequisite early reading skill and what some of the research indicated. The intervention was then described in detail to Medlock and Raven to provide a comprehensive overview of the treatment. Next, I modeled the intervention to both teachers in its entirety, taking the role of the instructor, and Medlock and Raven engaged as students. This exercise provided participants with the essential components of the intervention and acclimated the teachers to what students would experience. Subsequently, Medlock and Raven were provided opportunities to model the intervention, in front of the group, in order to eliminate any potential hesitancy regarding implementation. The final component was an indepth discussion regarding what fidelity

of treatment encompassed. Fidelity of treatment for this intervention was described to Medlock and Raven as a minimum of 5 minutes in length with one minute designated for the teacher objective script. The professional development session provided participant teachers with the weekly rapid letter randomized naming serial formatted matrices that were utilized with students throughout the 10-week treatment period as well as classroom delivery instructions. Participant kindergarten teachers were required to utilize the non-sequential letter practice with students for 5 minutes daily for a total of 10 weeks. Observations after the conclusion of the intervention continued for 4 weeks to determine whether instructional practices in letter knowledge improved as a result of having participated. A post-intervention interview was conducted with both Medlock and Raven to gather their input regarding the intervention.

Statement Regarding Human Subjects and the Institutional Review Board

In Spring 2016, a proposal to the IRB was submitted in order to request exemption from full review. IRB exemption was requested as although human subjects were involved in this study, it met the guidelines for a quality improvement project as define by the TAMU IRB. Much care and concern was undertaken to ensure the utilization of practices that maximized privacy and minimized potential risk to participants. In May 2016, I received notification from the IRB that this study met the guidelines for quality improvement projects and therefore, exemption from full review was granted (Appendix F).

Goals, Objectives, and Activities

       Table 3 lists the goal, objectives, and activities established for this problem of practice. The goal of the study was to increase kindergarten participants' letter naming abilities after participation in a 10-week letter naming intervention. The table then outlines two objectives that connect to the primary goal for the study. Objective A provided participant kindergarten teachers with an initial professional development session designed to train them to properly administer the intervention. Objective B aimed at ensuring kindergarten students received the intervention for 5-minutes daily for a time period of 10-weeks. The activities are outlined in order to specifically meet the needs of each objective. Activity 1 discussed teachers' ability to implement the intervention after participation in the professional development session. Activity 2 discussed the weekly teacher observations that would ensure the fidelity of the intervention implementation. Therefore, table 3 demonstrates the relationship between the study's goals, objectives, and activities.

Table 3

Goals, Objectives, and Activities Associated with the Problem Solution

Goal	Objective	Activity
I. To increase the kindergarten participant students' letter-naming abilities after daily practice with non-sequential letter fluency practice for a 10-week implementation period.	A. To provide the participant kindergarten teachers with a professional development session that modeled the letter-naming intervention and provided background information regarding this critical precursory literacy skill in order to facilitate the non-sequential letter-name intervention. B. To provide participant kindergarten students with daily non-sequential letter fluency practice for a time period of 5 minutes over a 10-week period in order to increase fluency in letter-naming.	1. Participant kindergarten teachers utilized the knowledge gained from the professional development session to implement the non-sequential letter-naming fluency intervention for 5 minutes daily with participant kindergarten students for a total of 10-weeks. 2. Teacher observations were conducted during and after the intervention cycle in order to verify the execution of the intervention.

Sampling Design

Overview. Two kindergarten classes were involved in the study with a total of 47 students, 23 and 24 students in each kindergarten classroom. A non-participating kindergarten classroom with 21 students from the same campus was utilized as the control. The control group received traditional instructional delivery in the area of letter-name knowledge, while the participant classes utilized weekly non-sequential serial letter matrices. There are three total kindergarten classrooms at Lancaster Elementary School. These classes were selected for the study because my office was located on this campus. Therefore, the location provided convenience and accessibility to the participant kindergarten classrooms.

Participants

Students. Sixty-eight kindergarten students were utilized from three kindergarten classrooms located at Lancaster Elementary School in Lancaster ISD. A convenience sample was utilized for this study. Lancaster Elementary School is located on the south central sector of the city of Lancaster and was originally built in 1989 as Lancaster Junior High School. The school remained a junior high until 2006, when it was transformed into an elementary campus that housed prekindergarten through 5th grade students. The final elementary school year for this campus was the 2016-17 school year. For the 2017-18 school year, Lancaster Elementary students transitioned, just a few miles away, to a newly opened elementary school called West Main Elementary, where they will remain. The building where Lancaster Elementary was located is transitioning, yet again, and will officially become a 9th grade campus for the

2018-19 school year. Eighty-nine percent of the Lancaster Elementary students were considered economically disadvantaged; 79% were African American, 17% Hispanic, and 3% White. The city of Lancaster, Texas has a population that is comprised of approximately 69% African American, 20% Hispanic, and 13% White (General Information, 2010).

Teachers. Medlock and Raven were the 2 selected participant kindergarten teachers from Lancaster Elementary School. This was Medlock's second year and Raven's fifth year teaching kindergarten. The control teacher, Millner, had 15 years of experience teaching students in several different elementary grade levels. The 2 teachers with the least classroom experience were selected as the participant teachers particularly because of their kindergarten experience. Consequently, I had stronger working relationships with both Medlock and Raven and had worked closely with both since they began in the district in my capacity as an Early Childhood Literacy Specialist. I did not have a relationship with Millner and had not worked with her in any capacity previously. I believed that both participant teachers would be willing and able to participate in this study based on my work interactions and experiences with them. Each participant teacher experienced an initial professional development session designed to instruct on effective administration of the intervention treatment for students.

Procedure. The 2 participant kindergarten teachers selected for this study located at Lancaster Elementary School received an initial professional development opportunity in February 2016 which prepared them to properly administer the treatment intervention. The control kindergarten teacher, also located at Lancaster Elementary,

was utilized in order to have a comparison analysis of students exposed only to traditional letter knowledge instruction. The professional development session supplied them with the weekly serial randomized letter fluency matrices and a student learning objective teacher script (Appendix H) that they utilized daily with their kindergarten students for the entirety of the treatment period. Participant teachers practiced the serial randomized letter matrix with their students for 5 minutes daily for a period of 10 weeks. A total of 10 matrices were utilized during the intervention period; one per week (Appendices J-S). The participant teachers were observed once each week using the Classroom Observation Rubric (Appendix G) to ensure that the treatment was provided to students with daily consistency. The weekly observations ensured that participant kindergarten teachers were providing a minimum of 5 minutes of daily non-sequential letter practice with the serial randomized letter matrix. The randomized letter matrices were comprised of 110 upper and lowercase letters in a randomized order with 11 letters in each row with a total of 10 rows printed on 18" x 24" inch poster-size. KG Miss Kindergarten font was utilized for each matrix with a 30-point letter size. This front was selected based on its large easy-to-read manuscript akin print. The randomized letter fluency practice was provided to participant kindergarten students in a whole group setting. Teachers were not required to follow the teacher script verbatim. The script was provided as a mechanism to initially acclimate teachers with the intervention. The observation instrument was a rubric that measured the following elements: timeframe, learning objective, and student engagement. The observation rubric was not intended as an evaluative tool, but as an anecdotal record-keeping device to substantiate the

79

consistency/fidelity of the interventions. If participating teachers did not adhere to the daily letter fluency practice for the specified 5-minute time period, then observations would have been increased to biweekly. An additional teacher training session would have been provided to a teacher found not adhering to the daily specified timeframe after documented biweekly observations. The observations would have then increased to three times per week for noncompliance and another teacher training session would have been added if a teacher failed to integrate the required 5-minute randomized letter treatment as prescribed after biweekly observations documented the lack of fidelity in participation. However, neither Medlock nor Raven deviated from the time requirement based on weekly classroom observations; therefore, observations remained once weekly throughout the implementation period of the study.

Guiding questions. The primary guiding question for this study queries whether a specifically designed systematic letter-naming intervention will be effective in addressing letter knowledge deficiencies for kindergarten students. More specifically: Can the percentage of kindergarten students score on grade level in letter identification increase significantly with consistent daily non-sequential upper and lowercase letter practice when compared to a control group with traditional curriculum?

List of Questions Before, During, and After the Proposed Intervention

(Before):

1. (QUAN) How well did kindergarten students in Medlock and Raven's classes perform on the Istation® Literacy Screener before the intervention treatment period when compared to the control group, Millner's class?

(During):

2. (QUAN) How well did kindergarten students in Medlock and Raven's classes perform on the Istation® Literacy Screener during the intervention treatment period when compared to the control group, Millner's class?

3. (QUAL) Were the teachers delivering the intervention with fidelity during the intervention treatment period?

(After):

4. (QUAN) How well did kindergarten students in Medlock and Raven's classes perform on the Istation® Literacy Screener after the intervention treatment period when compared to the control group, Millner's class?

5. (QUAL) How have teachers' instructional delivery in letter-naming improved as a result of having participated in this study?

Data collection. Students' Istation® Literacy Screener Scores from both treatment and control groups were collected before implementation of the intervention in order to determine students' proficiency in letter knowledge prior to introduction of the intervention. All kindergarten students were assessed using the Istation® Literacy Screen in January 2017, and those assessment reports were accessible through the Istation® website using the administrator district-level login information.

During the implementation phase of the study, the data sources consisted of students' Istation® Literacy Screener Scores during the treatment administration as well as classroom observation data to ensure the consistency, appropriacy, and adequacy with which the intervention was delivered to students. Kindergarten student participants were

assessed a second time in March 2017, during the course of the intervention, and those assessment reports for letter knowledge upon completion were accessed through the Istation® website. The students' quantitative Istation® Scores on the subtest of Letter Knowledge were analyzed to determine student growth in the area of letter knowledge. Student assessment data were analyzed to determine levels of progress based on intervention treatment compared to the traditional curriculum group. The qualitative classroom observation data were disaggregated to determine if teachers were delivering non-sequential letter instruction as instructed based on the teachers' professional development training session.

After completion of the study, the data sources consisted of students' Istation® Literacy Screener Scores following completion of the 10-week intervention treatment in addition to control group data. Kindergarten student participants were assessed for a third time in May 2017 using the Istation® Literacy Screen Assessment, and assessment reports for the subtest of letter knowledge were accessed through the Istation® website. The students' quantitative Istation® Scores on the subtest of Letter Knowledge following the treatment timeframe were analyzed to determine the level of student growth compared with the traditional curriculum group. The qualitative classroom observation data were utilized to ensure teacher consistency/fidelity and integration of the intervention with students for the required daily 5-minute time period. Teachers continued to receive classroom observations for 4 weeks following the conclusion of the intervention to track teacher progress in letter knowledge instruction. This qualitative data was analyzed to answer guiding questions for the study.

Procedure for Professional Development and Teacher Observation

      Protocols and instruments. Participant teachers received weekly observations to ensure that the intervention treatment was delivered for the required 5-minute timeframe to participant students for a total of 10 weeks; therefore, a total of 20 observations were conducted over the course of the implementation. A classroom observation rubric was created in order to document the most critical elements of the intervention: timeframe, objective, and student engagement (Appendix G). The timeframe component on the rubric had a scale from 1 to 5 with the numbers equating to the number of minutes that the intervention lasted during the recorded observation. The objective area of the rubric was scored as either a 1 or a 5 with the number 5 indicating that the teacher discussed the objective for the intervention with students and a 1 indicating that she did not discuss the objective for the intervention with students. The objective was deemed to be one of the observation criteria in order to be a consistent reminder to students about why they need to engage with the letter intervention. The hope was that the objective would aid in maintaining student engagement as students began to understand the importance behind learning the letter names. Student engagement was the final component of the observation rubric and the scale ranged from 1 to 5 with a 5 being the highest level of student engagement between 85%-100%. Student engagement, for purposes of this study, was defined as students looking at the letter matrix while saying the names of the letters chorally with their classmates. Twenty classroom observations were video-recorded so that observations could be referenced as needed.

Analysis of data. The present study did not utilize qualitative analysis software for coding purposes. Software systems designed to aid researchers in analyzing qualitative data are becoming more prevalent. These systems provide efficiency for handling large data sets for qualitative research purposes (Andrew & Peter, 2007). However, critics argue that there is no substitute for traditional qualitative methodologies such as hierarchical coding. The belief is that qualitative data software cannot attempt to address the ambiguities present in social interaction and/or context-dependent meaning sets (Prein et al., 1995; Dohan & Sanchez-Jankowski, 1998). Therefore, traditional approaches for coding qualitative data were utilized as the analysis mechanisms for the present study in order to preserve and ensure the researcher's contextual interpretations.

Interviews were conducted in Fall 2016 with several key stakeholders in Lancaster ISD to determine an overall understanding of how the district historically and currently addressed and addresses letter-name knowledge. Therefore, interview data obtained through the interview process was utilized as one of the qualitative data components. The qualitative data acquired during interviews was coded by sorting the illustrative statements of conversants based upon their responses. Appendix E contains a list of the interview questions posed to all conversants. Coding is the process of analyzing interviewee responses and creating a word to represent categories (Creswell, 2014). Coding specifically takes segments or sentences and labels the categories with a reflective term that often utilizes actual language drawn directly from somewhere amongst the interviewee's statements and is referred to as an in vivo term (Creswell,

2014). The process of coding can be used to both summarize and condense data

(Saldana, 2009). A code captures the content and substance of a datum not dissimilar to

the way that a title often captures the essence of a book, movie, or poem (Saldana,

2009). The interviews conducted were transcribed for researcher observation and

analysis. Triangulation is the process of ensuring that data is valid; it is the act of being

skeptical and delving deeper to validate meaning. In the case of qualitative research,

triangulation is checking to ensure that what someone said was interpreted correctly

(Stake, 2010). Interviewees were offered transcripts of their interviews but all declined.

However, I read through the transcriptions a number of times to provide ample time for

reflection and overall meaning determination. Interviewee responses were then coded

and grouped according to commonalities in their statements and categorized based on

categories and values that emerged. Interviewees were charged to answer interview

questions based upon either their historical knowledge of district beliefs and/or their

professional knowledge of letter naming; therefore, the categories of Organizational and

Professional were generated. The organizational category referring to whether

statements expressed context connected to their historical district perspectives of how

Lancaster ISD previously addressed letter knowledge instructionally within the district.

The professional category was chosen when the conversants' remarks were based upon

their professional understanding through experience or education of letter knowledge.

Once an illustrative statement was determined to be either Organizational or

Professional, then statements were grouped and themes were produced to best match the

values expressed by each stakeholder. The values of Order, Readiness, Effectiveness,

and Consistency came about based upon stakeholder responses. Category and value statements were then ranked from 1 to 10 based upon the number of times that conversants mentioned these ideals during their interviews with a rank of 1 being the most important as expressed by interviewees.

Table 4 displays the categories and the coordinating value of statements expressed by the interviewed Lancaster ISD stakeholders. Germane value categories consist of personal, professional, organizational, and societal values that are prevailing in a situation (Cuban, 2001). Organizational values are beliefs linked to the practices and philosophies taking place within the district; consequently, the majority of the values that arose from the interviews conducted corresponded to this category. I was unsurprised that this particular theme dominated the categories, because the problem of letter knowledge within the district appears to be a systemic issue. Professional values were those ideals mentioned that connected to the premise of educators' classroom instructional practice; however, the professional value: order category contain the top three values generated based upon interviewee responses (Table 4). I was excited that the order value connected to the professional theme arose, as similar ideas among conversants, because I was unsure whether interviewees would agree with my philosophy and Record of Study theme that daily non-sequential letter intervention should hypothetically increase student cognition in letter knowledge. The most important values that were expressed were those connected to the ideals of organizational readiness, where interviewees consistently acknowledged the district's viewpoint that students that do not master acquisition of the letters of the alphabet in

kindergarten will potentially fall behind their peers in development of crucial pre-literacy skills leading to later fluency in reading. Conversants acknowledged this organizational belief that mastery of letter names is a key component associated with kindergarten readiness; therefore, correlations were made based on their interview statements in relation to the district's perceived ideologies, which were labeled as Organizational Readiness. There were not necessarily any opposing viewpoints, only a minor difference in opinion from the current principal of Lancaster Elementary School that was interviewed on her belief of when she perceived students would actually be considered deficit in the skill of letter recognition.

Table 4

Rank-Ordered Table of Values, Conversants, and Illustrative Statements

Rank	Category and Value	*Conversant	Illustrative Statement(s)
1	Professional Value: Order	Principal	"Typically, teachers explicitly teach the letters in order from A-Z and rarely remix the letters. When this happens students are only superficially memorizing the letters."
2	Professional Value: Order	District School Support Office	"I believe that consistent daily non-sequential practice, both in isolation and in real-world settings is key to decreasing the number of kindergarteners scoring low on letter identification."

Table 4 Continued

Rank	Category and Value	*Conversant	Illustrative Statement(s)
3	Professional Value: Order	District School Support Office	"We have emphasized the importance of out-of-order practice of both letter names and letter sounds."
4	Organizational Value: Readiness	Executive Director of Academics and Innovation	"...kindergarten students who come to school with deficits in letter recognition are more likely to lag behind their peers who are proficient in recognizing letters."
5	Organizational Value: Readiness	District School Support Office	"Insufficient fluency in letter identification hampers competence in letter-sound identification, which in turn impedes both decoding and encoding tasks."
6	Organizational Value: Effectiveness	District School Support Office	"We have strengthened our professional development offerings."
7	Organizational Value: Effectiveness	Executive Director of Academics and Innovation	"…provide professional learning opportunities and research based, innovative strategies to strengthen teachers' capacity to deliver instruction."
8	Organizational Value: Effectiveness	Executive Director of Academics and Innovation	"Fidelity in the implementation of these strategies increases students' chances for reading readiness and successfully learning to read over time."
9	Organizational Value: Consistency	Executive Director of Elementary Education	"The district has focused more on math and science and a lot of those practices that we know should happen on a day to day basis have not necessarily been happening."

Table 4 Continued

Rank	Category and Value	*Conversant	Illustrative Statement(s)
10	Organizational Value: Consistency	Executive Director of Elementary Education	"It is inconsistently happening and that is part of what we are doing with the Literacy Framework is trying to put some of those pieces back in place as mandatory pieces."

Notes: Conversants have the following roles in the situation

- School Support Officer for Early Childhood Literacy has been intimately involved in English Language Arts Reading at the district level since 2002.
- Executive Director of Academics and Innovation is responsible for overseeing all curriculum, instruction, and assessment for the district.
- Campus Principal at Lancaster Elementary School is the principal where the research collection for the ROS will take place.
- Executive Director of Elementary Education was formerly the principal of Lancaster Elementary School. She now oversees all elementary principals and ensures that consistent best practices are being implemented district-wide.

Analysis of post-intervention data. Interviews were conducted with the participating teachers, Medlock and Raven, in June 2017, post-intervention, in order to gather valuable insight into their overall impressions of having participated in this study. Qualitative data obtained from their interviews was utilized as a mechanism to assist in answering the fifth guiding question: How have teachers' instructional delivery in letter-naming improved as a result of having participated in this study? This data also provided much needed feedback on each aspect of the intervention implementation process.

Data collected as a result of these post-intervention interviews was coded via traditional methods just as was done for the district stakeholder interviews that took place in Fall 2016. The statements provided by Medlock and Raven were coded and grouped based upon related responses. The terms developed attempted to capture the essence of their statements. The statements within each overarching group were tallied to determine which themes arose most frequently. The belief was that traditional coding modes would better capture the essence of the contextual meaning behind each participant teacher's statements. Appendix I provides a comprehensive list of the questions that posed to both Medlock and Raven.

Table 5 highlights the values that surfaced through the interview statements of Medlock and Raven during their post-intervention interviews. There were three predominant values that arose, throughout their conversations: benefit, understanding, and modification. The value "benefit" came to be as a result of ideas expressed by Medlock and Raven that reflected perceived teacher and student advantages from having participated in this study. "Benefit" was the most prevalent theme based upon coding of the transcripts and ranking of the illustrative statements. The second most predominant value to emerge was "understanding." The term "understanding" originated through statements expressed that seemed to typify that overall student understanding in both the importance of letter knowledge and fluency in letter knowledge burgeoned as a result of students having been exposed to this intervention. Finally, the third most prevailing value that developed was coined "modification." "Modification" seemed to be

indicative of comments that expressed ways that the intervention could be improved or

changed in order to improve its effectiveness.

Table 5

*Rank-Ordered Table of Values, Participants, and Illustrative Statements – Post
Intervention*

Rank	Value	*Conversant	Illustrative Statement(s)
1	Benefit	Raven	"The 10-week timeframe was perfect in that it gave the lower students a chance to build stamina and achieve success without feeling inadequate. Everyone was able to "shine" by the end of the 10-week timeframe as opposed to a shorter timeframe where only the high/medium students would have the opportunity to experience success."
		Medlock	"I do believe the students benefitted from this intervention because I observed an increase in letter knowledge within their EOY Istation results." "I would do this intervention with my students again because it added to their morning circle time and allowed opportunity for them to practice letter recognition in an engaging way."
2	Understandin g	Raven	"The rationale for reiterating the intervention objective daily with students was to ensure that students understand the importance of letter knowledge and how it directly affects their ability to read. It also caused them to be more intentional about the task for fear of being "the one" who wasn't ready."

Table 5 Continued

Rank	Value	*Conversant	Illustrative Statement(s)
3	Modification	Medlock	"I would incorporate rapid letter sound knowledge also."
		Raven	"I did customize it by changing the order in which the letters were read after the first few weeks (i.e., starting from the bottom and going up the chart, starting from the end of the row and going backward, and/or going by group to check for understanding)."

Timeline

The timeline is organized chronologically and details all major activities that transpired as a part of this record of study. The activities provide a detailed account of the type of data needed and details the artifacts required for collection, analyzation, and products/audiences as a part of the study. The timeline provides a visual representation of the evolution of this study.

Assessing and Addressing Letter Name Knowledge, A Critical Attribute in Kindergarten Readiness: A Mixed Methods Approach

Mo	Wk	Contact/Activity	Collect	Analyze/Action	Product/Audience
		Activities Before Study Begins			
1 Oct	1	Principal/ Assistant Superintendent – Request permission – Present Overview	Information sheets of study	Complete the sheets	Proposal to principal
	2	Return formal request to School Review Board			

	3	Conduct interviews with key district stakeholders	Interview statements	Transcriptions	Anecdotal Qualitative interview data
	4	Receive approval			
Pre-Intervention Activities					
2 Jan	1	Contact teachers and request their involvement	ISD Permission slips		Communicate with principal
	3	Hold introductory meeting – discuss purpose and requirements of study			
	4	Analyze Istation® Literacy Assessment Scores – before intervention		Istation® before intervention Scores	List of participant students and their scores
Intervention Activities					
3 Feb	2	Hold professional development session -- train teachers on intervention treatment			
	3-4	Classroom Observations	Classroom Observation Rubric	Observation Analysis	Observation Rubric / Participant Teachers
4 March	1-3	Classroom observations	Classroom Observation Rubric	Observation Analysis	Observation Rubric / Participant Teachers
	4	Analyze Istation® Literacy Assessment Scores – during the intervention treatment		Istation® Scores during the intervention treatment	
5 April	1-4	Classroom observations	Classroom Observation Rubric	Observation Analysis	Observation Rubric / Participant Teachers

93

6 May	1	Classroom observations	Classroom Observation Rubric	Observation Analysis	Observation Rubric / Participant Teachers
		Post-Intervention Activities			
	2-4	Classroom observations	Classroom Observation Rubric	Observation Analysis	Observation Rubric / Participant Teachers
	5	Analyze Istation® Literacy Assessment Scores – after the intervention treatment		Istation® Scores – after the intervention treatment	List of participant students and their scores
7 June	1	Use open-ended questions to interview the staff, post-intervention	Interview statements	Transcriptions	Qualitative interview data
		ROS Preparation			
8 Sep	1-4	Write drafts of ROS/Dissertation chapters, share with chair	Develop detailed schedule with chair to complete by deadlines	Complete all analyses; synthesize information	Draft copies and eventual Final Draft/share with Thematic Chair
9 Oct	1-3	Share final copy of ROS/Dissertation with Chair (allow 2 weeks) and make corrections			
	4	Share ROS/Dissertation with Committee			Final Draft
10 Nov	1-4	Defend by deadline Receive Thesis clerk approval			
11 Dec		Graduate			
		Share final copy with stakeholders			Summary of Findings; Copy of Completed Study

ROS Process

In this mixed methods study, both quantitative and qualitative data were utilized (Creswell & Plano Clark, 2011). See the study diagram (Figure 4), to demonstrate how the convergent parallel design was utilized to determine the effect of the intervention by collecting Istation® letter knowledge data before, during, and after the study. The diagram demonstrates the data collection process that took place within the parameters of the study. Istation Letter Knowledge assessment data was utilized to include in a quasi-experimental quantitative design that involved both participant and control groups in an effort to determine the effectiveness of the treatment translating into improved student achievement. The implementation of a professional development session and weekly classroom observations designed to inform practice in the sublexical area of letter recognition were utilized to inform teacher instructional practice.
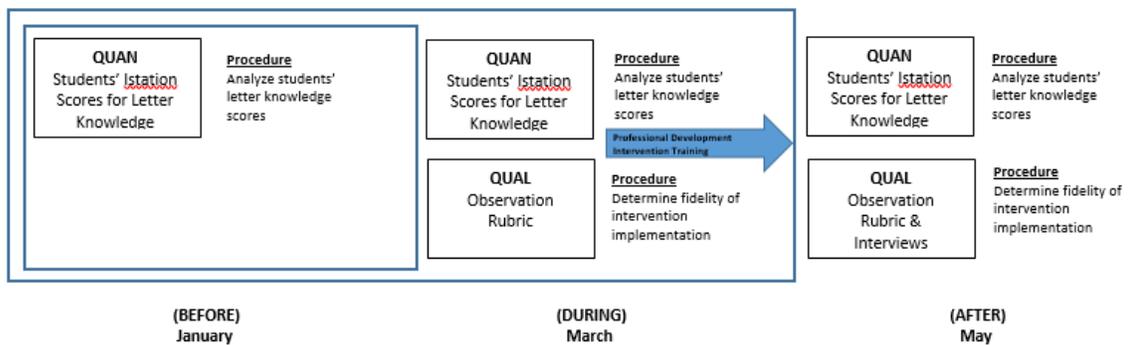
Figure 4. ROS process.

Ethical Concerns

   I have reviewed AERA's Code of Ethics and have identified no potential ethical

concerns in relation to the conduct of my study. Care was taken to ensure confidentiality

of records, data, and any other research information during the study. Kindergarten

students participated in the study and received daily letter naming intervention;

therefore, IRB exemption from full review was requested. In the light of these ethical

considerations, I requested IRB exemption from full review and was approved to

conduct this mixed methods study.

CHAPTER VII

RESULTS

Quantitative Data

The data set contained letter recognition scores for three time periods (January, March and May, 2016) for three classes (Medlock and Raven classes are the experimental groups, Millner class is the control group). To test whether the groups differed significantly before treatment began, a one-way analysis of variance (ANOVA) was conducted on the pretest score, with "group" as the independent variable and "letter knowledge scores" (Time 1) as the dependent variable. Table six shows the ANOVA results.

Table 6

One-way Analysis of Variance for the Pretest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	711.255	2	355.627	1.681	.196
Within Groups	10787.996	51	211.529		
Total	11499.251	53			

Results of ANOVA indicated that the three groups did not differ in their letter knowledge before the start of intervention (p=.196). Then we ran two 2x3 analyses of covariance (ANCOVA), with "group" as the independent variable and "letter knowledge scores" (Time 2 & 3) as the dependent variable, controlling for age (i.e., covariate). Participants were all between 5 and 6 years of age. Table 7 presents results of ANCOVA for the immediate posttest.

Table 7

Tests of Between-Subjects Effects for the Immediate Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2285.777[a]	3	761.926	3.132	.037	.203
Intercept	11552.868	1	11552.868	47.488	.000	.562
Age	131.855	1	131.855	.542	.466	.014
Group	2057.749	2	1028.875	4.229	.022	.186

Table 7 Continued

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Error	9001.413	37	243.281			
Total	1682855.604	41				
Corrected Total	11287.189	40				

ANCOVA results for the immediate posttest indicated, when statistically controlling for age, the two experimental groups outperformed the control group (p=.037). Tukey's post-hoc test was conducted to identify which group statistically differed from the others. Table 8 presents the results of the post-hoc test and table 9 presents adjusted mean scores for the three groups.

Table 8						
Pairwise Comparisons for Immediate Posttest						
(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
Control Group	1	10.854	6.157	.086	-1.621	23.329
	2	-6.976	5.855	.241	-18.839	4.887
Experimental Group 1	0	-10.854	6.157	.086	-23.329	1.621
	2	-17.830[*]	6.147	.006	-30.285	-5.376
Experimental Group 2	0	6.976	5.855	.241	-4.887	18.839
	1	17.830[*]	6.147	.006	5.376	30.285

Table 9

Adjusted Mean Estimates for Immediate Posttest

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Control Group	202.711[a]	4.076	194.451	210.970
Experimental Group 1	191.856[a]	4.537	182.663	201.050
Experimental Group 2	209.686[a]	4.173	201.231	218.142

The Tukey post-hoc test showed only the mean for experimental group 2 (i.e., Raven class) showed statistically significant differences with the control group (i.e., Millner class). From Table 9 we can also observe that there is a 7-point mean difference (M=202.7 for the control group and M=209.69 for experimental group 2) between the means of letter knowledge scores between the control group and experimental group 2. This indicated that the intervention generally was effective, but the effect was more pronounced for experimental group 2 (i.e., Raven class) than experimental group 1 (i.e., Medlock class).

Finally, to test whether the intervention effect lasted for the delayed posttest, we conducted an ANCOVA for letter knowledge score for the delayed posttest. Table 10 presents results of the ANCOVA analysis.

Table 10

Tests of Between-Subjects Effects for Delayed Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	380.212[a]	3	126.737	.798	.506	.087
Intercept	7530.350	1	7530.350	47.432	.000	.655
Age	4.732	1	4.732	.030	.864	.001
Group	373.933	2	186.966	1.178	.325	.086
Error	3969.062	25	158.762			
Total	1280551.124	29				
Corrected Total	4349.274	28				

ANCOVA results for the delayed posttest indicated when age was statistically controlled, there was no statistically significant difference between the groups (p=.325).

Table 11 presents adjusted means taking into account the effect of the covariate (i.e.,

age).

Table 11				
Adjusted Mean Estimates for the Delayed Posttest				
			95% Confidence Interval	
Group	Mean	Std. Error	Lower Bound	Upper Bound
Control Group	207.592[a]	4.049	199.253	215.931
Experimental Group 1	207.889[a]	3.696	200.277	215.501
Experimental Group 2	216.141[a]	4.763	206.330	225.951

We can observe that the adjusted mean score for the control group was nearly the

same as experimental group 1. Only experimental group 2 had a higher adjusted mean

than the other groups. However, the adjusted mean scores for the two experimental

groups actually increased. The increase was especially pronounced for experimental

group one as the adjusted mean scores increased from 191.86 to 207.89 from the posttest

to the delayed posttest. Therefore, even though the control group performed equally well

as the experimental groups for the delayed posttest, the intervention still was effective because the two experimental groups showed increased adjusted mean scores.

In conclusion, results of ANOVA analysis showed the three groups were equal before intervention was administered. The two ANCOVA tests for the letter knowledge scores for the immediate and delayed posttests indicated that the experimental groups only outperformed the control group for the immediate posttest, with experimental group 2 showing the most statistically significant mean difference (M=209.67). Although the comparison results of the mean for 3 groups did not show a statistically significant difference (M=207.59 for the control group, M=207.89 for experimental group 1 and M=216.14 for experimental group 2), there was a tendency for the participants in the experimental groups to show improvements in adjusted mean scores, indicating the effectiveness of the intervention.

Qualitative Data

Post-intervention observations. Immediately concluding the 10-week intervention implementation period, classroom observations continued on a weekly basis in the classrooms of both Medlock and Raven for 4 weeks in order to answer the final guiding question of the study: How have teachers' instructional delivery in letter-naming improved as a result of having participated in this study? Both teachers received one observation per week just as was done during the timeframe of the intervention. Teachers understood that the intervention period had ceased and that they were no longer required to continue the daily non-sequential letter-naming intervention with students. However, Medlock and Raven were told that classroom observations would continue in

order to continue to track progress in the areas of letter identification. The classroom observation rubric continued to be utilized during this post-intervention observation cycle. Both Medlock and Raven continued to implement the letter-naming intervention with their students post-intervention even though there were no requirements or recommendations after the 10-week cycle. However, the way that the intervention was conducted in each classroom was markedly different.

Timeframe. During the 10-week implementation phase, teachers had been originally trained to conduct the intervention with students for a five-minute time span daily. However, after the 10-week period ceased, teachers were made aware that they were no longer obligated to utilize the non-sequential serial matrix letter-naming intervention with students. Subsequent observations that occurred "after" the intervention time-period were tracked using the Classroom Observation Rubric (Appendix G) in order to record how letter-naming instruction was addressed post-intervention.

In the classrooms of Medlock and Raven, both instructors continued to adhere to the originally required 5-minute daily intervention, possibly due to the routine that the intervention induced for the ten-week timeframe. Both teachers set timers for 5 minutes, typically a cell phone was utilized as the timer, prior to the start of the intervention in order to ensure that they were adhering to the originally required time requirement of the non-sequential letter intervention with their students. The letter-naming sessions ended in both classrooms shortly after the timer signaled the conclusion of the 5-minute

practice period. Neither participant teacher deviated from the 5-minute timeframe during any of the four-weeks of post-intervention classroom observations.

      Objective. During the original professional development session, participants were provided a learning objective teacher script (Appendix H). The script was furnished in order to provide implementation support for teachers. The script provided students with the learning objective for the intervention. Teachers were told that the script could be read to students verbatim or that teachers could develop their own objective to share with students instead. However, the nonnegotiable component was that students were to be provided a learning objective of why they were practicing their letters with the non-sequential letter-naming matrix. The only caveat given was to spend no more than 1-minute on the objective portion in order to maximize the instructional time in which students were practicing their letters with the intervention. Therefore, a minimum of 4-minutes was to be spent on student letter-naming practice.

      Participants were observed for a total of 14 weeks; 10 weeks during the intervention period and 4 weeks post-intervention. Medlock consistently utilized the teacher objective script with students during each classroom observation during each of the 14 weeks. During observations, Medlock never deviated from the teacher observation script; she kept a printed version of the script near her podium and utilized it to read to students verbatim prior to beginning the intervention daily. Raven had a few more years of classroom experience than Medlock, and she seemed much more at ease with the letter-naming intervention. Raven never read from the provided teacher objective script, she seemed to incorporate much more of an improvisational objective

with her students. Raven would remind students that they would need to follow along and pay close attention to each letter. Raven's classroom management style was very effective, so she would utilize the teacher objective one-minute timeframe to strongly encourage positive student behaviors by reminding students to stay engaged in the practice and specifically to keep their legs criss-crossed, their hands in their laps, and the direction of their eyes forward on the letter-naming matrix. Raven also consistently reminded students of the learning objective for the intervention, which was for students to learn their letters with fluency in order to assist them in the process of learning to read. The two teacher objective delivery styles for Medlock and Raven were strikingly different; however, my belief was that both accomplished the same intended goal. Both styles provided kindergarten students the necessary "why" behind the non-sequential letter-naming daily practice regardless of the nuances in execution.

Student engagement. Student engagement was another component of the Classroom Observation Rubric. This category was designed to track the percentage of total classroom student engagement during individual 5-minute intervention sessions. The rubric reflected a rating system from 1 to 5. A valuation of 5 determined that between 85-100% of students were actively participating in the intervention and a rating of 1 denoted between 0-39% classroom participation. The higher the rating the more the percentage of student participation. This particular component was the most cumbersome to track, video recordings of the observation had to be reviewed in order to determine the level of classroom engagement. Students that temporarily disengaged but

shortly afterward re-engaged were not counted against the teacher. This rating was an overall student participation average during the 5-minute intervention session.

Both teachers were very adept at ensuring the level of engagement was high during instructional sessions in their classrooms. Medlock utilized several non-verbal hand signals to refocus students whose attention waned. She would make eye contact with individual students, hold up one index finger, and/or point to the serial matrix in an effort to refocus students that lost attention. The students in Medlock's classroom seemed to be very familiar with her nonverbal cues for re-engaging student focus. Most students immediately recognized her signals and began participating again in the letter-naming intervention with very little additional prompting. It was very apparent that Medlock had spent significant time training students consistently and thoroughly in her non-verbal cueing system. Throughout the 14 weeks of classrooms observations, Medlock always received the designation of 5 indicating that on average, between 85%-100% of her students were regularly engaged in the letter-naming intervention.

Raven often utilized more verbal behavior management strategies than nonverbal for regaining student attention. She consistently reiterated rules and procedures with students daily during the 1-minute teacher objective timeframe. Raven reminded students to sit criss-cross, keep their hands in their laps, and their eyes to remain on the letter-naming matrix at all times. Once Raven began the timed letter-naming intervention, she would at times say a child's name that she perceived to be off-task. By saying his/her name, this would usually refocus the student on the task of the intervention. However, it was apparent that Raven had spent ample time training

students to continue saying the letter-names as part of the intervention, regardless of whether she said the letter-name aloud or not. This preparation was exhibited when Raven would stop saying the letter names, in order to more closely observe student participation, her students would continue saying the letter names without hesitation. Therefore, it was apparent that Raven had spent time training her students in how to participate in the letter-naming intervention regardless of whether she was leading students by saying the letter-name first. Behavior management seemed to be a strength in her instructional repertoire. Raven's students rarely had to be redirected during the intervention timeframe. Students knew that if the teacher stopped leading the class in the letter-names, they were to continue saying the names of the letters. Raven would also use her pointer to tap the location on the matrix where students should be in order to regain students' attention. Therefore, Raven's students did not seem to lose any critical letter-naming instructional time due to the behavior training that she had apparently done with her students prior to implementing the intervention. Raven was able to redirect off-task behaviors, which were always minimal and the unaffected students would continue participating in the intervention and the off-task students would quickly re-engage in the intervention.

Execution. The major difference in how Medlock and Raven implemented the daily intervention surfaced in their delivery style. During the initial professional development training session, both teachers were informed that the intervention was to be conducted in a whole group setting with all students and the required time requirements were mandated. However, the training did not dictate the way the

intervention was to be delivered. Medlock was very consistent in her delivery approach.

She always said the name of the letter first and her students always chorally repeated the

letter name. Medlock's execution was very slow and methodical. Medlock would take

the entire 5-minute time period in order to cover all 110 randomized letters once. In

Raven's class, she seemed to believe that the intervention was directly connected to

increasing the students' letter fluency speed. Raven would use a pointer to touch each

letter on the matrix, she diligently watched each child's face ensuring their level of

participation. She rarely said the letter names and would only do so when she felt that

the choral letter-naming was lagging. Raven would then say the letter names with

students forcing them to rapidly cover each letter. At the pace at which she had students

saying the letters, students were able to go through at least 3-4 cycles through the matrix.

Therefore, Raven's students were given more letter-naming opportunities during the

daily 5-minute intervention window. Both teachers had the flexibility to modify the

intervention, as needed, in order to maintain high levels of student engagement as long

as the essence of the intervention was followed. The fidelity of the intervention was

paramount; however, the participant teachers had the autonomy to make adjustments,

when needed, or to facilitate in the way that best met their students' needs. In this way,

the teachers were able to act upon their agency and were empowered to make their own

instructional decisions.

 Post-intervention interviews. The final qualitative data component of the study

was post-intervention interviews conducted with Medlock and Raven in June 2017.

These post-intervention interviews addressed the fifth guiding question: How have

teachers' instructional delivery in letter-naming improved as a result of having

participated in this study? The feedback obtained also provides invaluable insight into

the perceptions of participant teachers and the implementation process of the study. A

comprehensive list of interview questions posed to Medlock and Raven are provided in

Appendix I.

Benefit. The term "benefit" surfaced through the process of coding the

qualitative data obtained through the participant teacher post-intervention interviews,

referring to statements that expressed ways that either the teacher or students had

benefitted from participation in the study. There were a number of statements from both

Medlock and Raven that corresponded to the value of "benefit."

Medlock specifically mentioned during her interview that she felt that her

students were able to increase their letter knowledge scores as evidenced by the

Istation® end-of-the-year assessment results because of the daily intervention that took

place as part of this study. Medlock also indicated that she would be willing to conduct

this particular intervention again with students, because it provided an engaging way for

students to practice letter recognition daily. She also indicated that this intervention

allowed her students to reach a goal that is a key expectation in kindergarten readiness.

Medlock believed that her students were able to internalize the importance of and

learning objective for letter recognition/knowledge during this process, and this was

achieved through the confidence they built by having participated in this intervention.

Towards the end of the interview, Medlock stated, "90% of my students scored in Tier 1

within Letter Knowledge on Istation® and more than half of the class were able to name

more than 40-50 letters on the end of year reading assessment." This statement from Medlock provided quantitative evidence to the benefits that she perceived her class received after participating in this study designed to improve letter-name knowledge for students.

Raven also had a number of statements or phrases during her interview that seemed to coincide with the value of "benefit." Raven implied that her students were challenged weekly by the changing of the non-sequential matrix; therefore, they were unable to memorize the letter pattern and had to truly internalize the letters and their names through this practice. She stated that the 5-minute daily practice timeframe positively impacted student achievement with the requirement that students had to say on task for the entirety of the intervention. Raven indicated that, as a result of this intervention, all of her students remarkably mastered rapid letter naming based upon their end of year reading assessment. She also remarked that the intervention from this study allowed students to build much needed stamina and even students that were struggling in letter-naming were able to achieve success without being made to feel inadequate through the whole-group daily practice. Raven stated, "Everyone was able to "shine" by the end of the 10-week timeframe" and her belief was that that would not have been the case if the intervention had been shorter than 10 weeks. She reflected that this study was a delight because her students had the opportunity to reach a critical goal that is already a component of kindergarten readiness. Raven commented that by participating in this study, she believed her students would become better readers and had made significant progress in the subject of reading. She stated, "One student

progressed from a rebus level in reading to a level 4 in the timespan of a 6-week period"

which she equated to his/her participation in this non-sequential letter intervention. Poor

readers who read at the beginning level typically start with rebus reading. Rebus is a

mode of expressing words and phrases by using pictures of objects whose names

resemble those words. Therefore, the student that Raven described began at the lowest

possible reading level and progressed to a Developmental Reading Assessment (DRA)

reading level 4 in a 6-week period. The positive feedback acquired from both Medlock

and Raven provided qualitative evidence to support the intervention utilized as a part of

this study.

Understanding. The value of "understanding" emanated predominantly through

the interview statements of Raven during the post-intervention interviews.

"Understanding" was the coding term utilized to express the connotation that student

understanding had apparently deepened or evolved related to letter-naming knowledge

as a part of having participated in this study. However, these statements were mentioned

frequently enough that they were deemed to require their own coding terminology and

were determined the second most prevailing theme throughout the post-intervention

interviews with Medlock and Raven.

In a statement from Medlock when asked about her thoughts as they related to

reiterating the daily objective with students, she replied that her belief was that the

objective repetition for students aided in their daily practice and ultimately in their

overall student understanding as the weeks progressed. When asked the same question

regarding the daily teacher objective, Raven reflected that the objective was essential in

students' understanding of the importance of letter knowledge, and how letter naming would directly affect their ability to read. Raven further commented that the teacher objective component of the intervention aided students in becoming more intentional about the letter-naming task and that students did not want to be considered "the one who wasn't ready." Both participant teachers commented on the importance of reiterating the objective with students daily to ensure that students had an overall understanding of why they were engaging in the intervention daily and the ultimate goal of the intervention was to increase and strengthen their letter-naming abilities to better prepare them for the journey toward becoming fluent readers.

Modification. The term "modification" materialized through the coding process, as a result of interview statements from Medlock and Raven in June 2017, that expressed a desire to make modifications or changes to the intervention in order to maximize its effectiveness. This term was the third most prevalent theme that arose during the post-intervention interviews with Medlock and Raven. Medlock mentioned early in her interview that she perceived this intervention would be more beneficial if it also included a rapid letter-sound component. She believed that the addition of letter-sound would aid in a more thorough overall comprehensive letter knowledge for students. Medlock also mentioned her belief that the five-minute daily timeframe component was too long and that a 3.5 minute-timeframe was more indicative of the average students' pacing. She specifically remarked that five-minutes was very difficult at first because her students wanted to rush through; however, they were able to acclimate to the time requirement as time progressed. Medlock reflected that 3.5 minutes would provide ample time to have

students slowly and methodically go through each letter in the matrix once, at an average pace per letter. Raven mentioned a number of times how she attempted to customize the intervention or made impromptu modifications in order to maximize student engagement levels. Raven indicated that she changed the order in which she practiced the non-sequential letter matrix with students. She stated that she would sometimes start from the bottom row instead of the first row in order to confirm student understanding. Raven mentioned that she would often move from right to left instead of the traditional left to right to ensure that students had not memorized the letter pattern and were truly engaged and internalizing the letter-naming learning. When asked about the five-minute daily timeframe requirement, Raven indicated that she too believe 5 minutes was too long for student focus purposes; however, students became accustomed to the task and would occasionally "go over" because they were "on a roll." The sentiments expressed by both Medlock and Raven were honest viewpoints that could potentially benefit the analysis of this study and provide valuable insight into future studies.

Instructional delivery. As was previously indicated, the post-intervention interviews conducted with Medlock and Raven helped determine whether participation in the study aided teachers in improving their instructional delivery as it relates to letter-name knowledge. It seemed clear in the statements expressed by both Medlock and Raven there was a perception that their classrooms benefitted from the intervention, and that students were able to make academic progress in letter-name knowledge by having participated in the non-sequential letter-naming intervention. The most predominant theme that surfaced through the post-intervention interviews reflected the numerous

benefits that students were exposed to through the intervention such as increased end of year letter knowledge results as evidence by Istation®, greater fluency in letter-naming, improved levels of student confidence, and overall student understanding of the importance of learning the letter names with automaticity. The statements of Medlock and Raven lend credibility to the notion that the study was able to increase instructional delivery in the area of letter-name knowledge by providing teacher with another strategy for attacking student deficits in this area. This intervention is yet another tool to be added to these teachers' repertoires to improve instructional delivery and assist students in reaching the goal of mastery in letter-name knowledge.

CHAPTER VIII

CONCLUSIONS AND IMPLICATIONS

Call to Action/Future Research

This study examined the implications for introducing a daily 5-minute non-sequential letter-naming practice with kindergarten students that transpired for a period of 10-weeks in two kindergarten classrooms. The goal of the intervention was to improve students' letter-naming fluency. The results of this study suggest that training students in non-sequential letter-naming does improve students' letter-naming abilities as evidenced by growth experienced on Istation® Letter Recognition Assessment results. However, there are additional considerations that would be necessary in order to improve upon the results of this study. One reflection might be to begin implementing the study at the beginning of the kindergarten school year. Another deliberation could be to expand the sample size to include multiple kindergarten classes throughout the district. Finally, since the Rapid Automatized Naming-Rapid Alternating Stimulus (RAN-RAS) Tests are the most widely utilized assessment of RAN; consideration should be given to utilization of this tool as a plausible assessment mechanism option (Norton & Wolf, 2012)

Limitations

There were several limitations that surfaced as this study progressed. The intervention was conducted daily in a whole group setting; however, in the research that was undertaken on letter-naming advantages, it seems apparent that all children have differing ability levels as it relates to letter-naming. Therefore, this intervention, while

the results indicated its effectiveness, may show greater potential if implemented in smaller more ability-based group sessions. Therefore, children with similar levels of letter knowledge would be grouped together. The teacher could more easily anticipate the group's potential pitfalls and be better prepared to address individual or group letter-learning needs. Individual small groups could take into account specific letters that have already been mastered and focus solely on those more difficult to acquire letters based on the group's deficits. This study's intervention was integrated as a one shoe fits all approach for letter-learning; however, research has consistently indicated the necessity of differentiating based on individual learning needs (Tomlinson, 2000). Hence, it seems only logical that to maximize the effectiveness of this letter-learning intervention, thought should be given to differentiating the strategy based on students' individual letter-knowledge needs and abilities.

There was another limitation that must be mentioned. This study lacked a qualitative data component in the "before" stage of the research. Before is referring to the timeframe prior to the implementation of the intervention, which would be January 2017 or before. Just to clarify, quantitative data was collected at three intervals during the study utilizing the Letter Recognition Istation® assessment in January (before), March (during), and May (after) in order to capture student progress in the area of letter-naming. Qualitative data was also captured from February through May 2017 using the classroom observation rubric (Appendix G). Participant teachers were observed conducting the intervention once per week and the classroom observation rubric was utilized during those instances to track teachers' implementation by looking at the

118

following measurements: timeframe, learning objective, and student engagement. My intentions were also to collect qualitative classroom observation data prior to implementing the intervention; however, a number of events prevented these efforts. I did not receive final approval from Lancaster ISD to proceed with this study until January 2017. Also, my proposal for this ROS was not officially approved until February 2017; therefore, time constraints prevented the addition of qualitative observations prior to the implementation of the study. Qualitative observation data may have painted a better portrait of how letter-naming was addressed prior to the study's intervention thus creating a clearer understanding of letter-naming methodologies utilized in the classroom.

Also to provide transparency into this study, interviewees were not provided transcripts of their interview conversations that could have corroborated their statements. The individuals interviewed both district stakeholders in Fall 2016 and participant teachers in June 2017 were each asked if they would like copies of their transcribed answers in order to review and authenticate; however, all interviewees declined. It is important to triangulate data in order to validate evidence. It would have been beneficial to the study to have had conversants validate their conversations.

The intervention for this study was shown to be effective based on the study's data analysis; however, this intervention should be utilized as an instructional strategy not as a primary instructional method. This type of intervention should not be used as the sole means by which to instruct early childhood students in letter knowledge. This intervention was used in conjunction with Lancaster ISD's adopted curriculum and other

best practice methodologies in order to thoroughly address the skill of letter knowledge. Therefore, addressing letter knowledge cannot be done effectively and best meet the learning needs of students without applying a barrage of research-based approaches that comprehensively meet the instructional letter-learning needs of each student.

Conclusions

This mixed-methods study sought to determine whether implementing a letter-naming fluency intervention would positively impact students' letter-naming abilities. Research was conducted at one of Lancaster ISD's most high performing elementary campuses based on Texas Education Agency distinctions in the areas of: ELA/Reading, Mathematics, Top 25 Percent Student Progress, Top 25 percent Closing Performance Gaps, and Postsecondary Readiness on the Texas Education Agency 2016 Accountability Summary (TEA Accountability Summary, 2016). Two kindergarten teachers were selected to participate in the implementation of the intervention, both educators with distinctively different levels of teaching experience; one teacher with only 2 years of experience and the other with 5 years in early childhood classrooms. The control teacher was also considered the most tenured classroom teacher with 15 years of elementary-level experience.

District-level stakeholders were interviewed in the Fall of 2016 to create a preliminary yet historical district perspective in order to better understand consistent student low performance in the area of letter knowledge. The viewpoints and ideas generated by these district-level individuals became the catalyst for the non-sequential serial formatted letter fluency intervention. The intervention was carried out in two

participating kindergarten classrooms for a 10-week period and a control group utilized only traditional letter learning methodologies. The ANCOVA results were able to substantiate the students' participation in the intervention; thus, indicating that non-sequential letter-naming fluency practice positively impacted students' letter-naming skills. Qualitative data in the form of classroom observations and post-intervention interviews also substantiated the validity of the intervention. Quantitative and qualitative data analysis were in alignment and further supported the intervention's claim that students benefitted from participation in letter naming fluency training and teachers' instructional practice improved as a result of participation in the study.

Scholarly Significance of the Study

This study provides further research related to letter-naming fluency practice specifically that of the frequency of letter exposure theory, discussed in detail in Chapter 2, which indicated the necessity of increasing the rapidity in which letters are presented to students in order to provide greater exposure to all letters of the alphabet (Jones & Reutzel, 2012). The intervention utilized for this study provided participant students multiple opportunities daily with each of the letters of the alphabet. This intervention allowed increased levels of letter exposure allowing for more repetition with each letter, which better met the individual learning needs of students. This study forwards the research of Fugate (1997) and Hayashi et al. (2013) that indicated that letter-identification training can positively impact students' letter naming abilities.

REFERENCES

Adams, M. J. (1990). Beginning to read: Thinking and learning about print. Cambridge, MA: MIT Press.

Adams, M. J. (2001). Alphabetic anxiety and explicit, systematic phonics instruction: A cognitive science perspective. *Handbook of early literacy research*, *1*, 66-80.

Adams, M. J. (2003). Alphabetic anxiety and explicit, systematic phonics instruction: A cognitive science perspective. In S. B. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research* (pp. 66–80). NY: Guilford Press.

Aghababian, V., & Nazir, T. A. (2000). Developing normal reading skills: Aspects of the visual processes underlying word recognition. *Journal of Experimental Child Psychology*, 76,103-150. doi:10.1006/jecp.1999.2540

Alexander, K. L. & Entwisle, D. R. (1996). Schools and children at risk. In A. Booth & J. F. Dunn (Eds.), Family-school links: How do they affect educational outcomes? (pp. 67–89). Mahwah, NJ: Lawrence Erlbaum Associates.

Alexander, K. L., Entwisle, D. R., & Olson, L. S. (2007). Lasting consequences of the summer learning gap. American Sociological Review, 72(2), 167–180.

Andrew, A. & Peter, E. (2007). Structuring qualitative enquiry in management and organization research: A dialogue on the merits of using software for qualitative data analysis. *Qualitative Research in Organizations and Management: An International Journal*, (1), 62. doi:10.1108/17465640710749117

Araújo, S., Reis, A., Petersson, K. M., & Faísca, L. (2015). Rapid automatized naming and reading performance: A meta-analysis. *Journal of Educational Psychology, 107,* 868 – 883. http://dx.doi.org/10.1037/edu0000006

Arnell, K. M., Joanisse, M. F., Klein, R. M., Busseri, M. A., & Tannock, R. (2009). Decomposing the relation between Rapid Automatized Naming (RAN) and reading ability. *Canadian Journal of Experimental Psychology, 63,* 173–184. http://dx.doi.org/10.1037/a0015721

Arnold, D. H., & Doctoroff, G. L. (2003). The early education of socioeconomically disadvantaged children. *Annual Review of Psychology*, *54,* 517-545.

Badian, N. (1995). Predicting reading ability over the long term: The changing roles of letter naming, phonological awareness, and orthographic processing. *Annals of Dyslexia, 45,* 29–96.

Biemiller, A. (1977-1978). Relationships between oral reading rates for letters, words, and simple text in the development of reading achievement. *Reading Research Quarterly*, 13, 223-253.

Blachman, B. A. (1984). Relationship of rapid naming ability and language analysis skills to kindergarten and first-grade reading achievement. *Journal of Educational Psychology*, 76, 610-622.

Blaiklock, K. E. (2004). The importance of letter knowledge in the relationship between phonological awareness and reading. *Journal of Research in Reading*, *27*(1), 36–57.

Boets, B., De Smedt, B., Cleuren, L., Vandewalle, E., Wouters, J., & Ghesquiere, P. (2010). Towards a further characterization of phonological and literacy problems in Dutch-speaking children with dyslexia. British Journal of Developmental Psychology, 28(1), 5–31.

Bond, G. L. & Dykstra, R. (1997). The cooperative research program in first-grade reading instruction. *Reading Research Quarterly*, 32, 345–427.

Both-de Vries, A. C., & Bus, A. G. (2014). Visual processing of pictures and letters in alphabet books and the implications for letter learning. *Contemporary Educational Psychology*, *39,* 156-163. doi:10.1016/j.cedpsych.2014.03.005

Bouchière, B., Ponce, C., & Foulin, J-N. (2010). Développement de la connaissance des lettres capitales. Étude transversale chez les enfants français de trois à six ans. Psychologie Française, 55, 65–89.

Bowers, P. G. (2001). Exploration of the basis for rapid naming's relationship to reading. In M. Wolf (Ed.), Dyslexia, fluency, and the brain (pp. 41–63). Timonium, MA: York Press.

Bowers, P. G. & Swanson, L. B. (1991). Naming speed deficits in reading disability: Multiple measures of a singular process. Journal of Experimental Child Psychology, 51, 195–219.

Bowey, J. A. (1995). Socioeconomic status differences in preschool phonological sensitivity and firstgrade reading achievement. Journal of Educational Psychology, 87, 476–487.

Bowey, J. A., Storey, T., & Ferguson, A. N. (2004). The association between continuous naming speed and word reading skill in fourth- to sixth-grade children. *Australian Journal of Psychology, 56,* 155–163. http://dx.doi.org/10.1080/00049530412331283345

Bowles, R. P., Pentimonti, J. M., Gerde, H. K., & Montroy, J. J. (2014). Item response analysis of uppercase and lowercase letter name knowledge. *Journal of Psychoeducational Assessment*, *32*(2), 146-156.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. Annual Review of Psychology, 53, 371–399.

Brizzolara, D., Chilosi, A., & Cipriani, P. (2006). Do phonologic and rapid automatized naming deficits differentially affect dyslexic children with and without a history of language delay? A study of Italian dyslexic children. Cognitive and Behavioral Neurology, 19, 141–149.

Burke, M. D., Hagan-Burke, S., Zou, Y., & Kwok, O. (2010). A structural equation model using fluency-based early literacy measures to predict emerging reading ability in kindergarten. *Remedial and Special Education*, *31*(5), 385-399. doi:10.1177/0741932509355949

Carroll, J.M., Snowling, M.J., Hulme, C. & Stevenson, J. (2003). The development of phonological awareness in preschool children. Developmental Psychology, 39, 913–923. doi:10.1037/0010-1649.39.5.913.

Carver, R. P., & David, A. H. (2001). Investigating reading achievement using a causal model. Scientific Studies of Reading, 5, 107–140.

Catts, H. W., Fey, M. E., Tomblin, J. B., & Zhang, X. (2002). A longitudinal

    investigation of reading outcomes in children with language impairment. *Journal*

    of Speech, Language, and Hearing Research, *45*, 1142–1157.

Catts, H. W., Fey, M. E., Zhang, X., & Tomblin, J. B. (2001). Estimating the risk of

    future reading difficulties in kindergarten children: A research-based model and

    its clinical implementation. *Language, Speech, and Hearing Services in Schools,*

    32, 38–50.

Celebrating Student Success (2014). Retrieved from

    http://www.Istation®.com/About/Press20140328

Cepeda, N. J., Coburn, N., Rohrer, D., Wixted, J. T, Mozer, M. C., & Pashler, H. (2009).

    Optimizing distributed practice: Theoretical analysis and practical implications.

    Experimental Psychology, *56*(4), 236–246.

Cepeda, N. J., Vul, E., Rohrer, D., Wixted, J. T, & Pashler, H. (2008). Spacing effects in

    learning: A temporal ridgeline of optimal retention. *Psychological Science*, *11*,

    1095–1102.

Chall, J. S. (1967). Learning to read: The great debate; an inquiry into the science, art,

    and ideology of old and new methods of teaching children to read, 1910–1965.

    New York, NY: McGraw-Hill.

Chall, J. S. (1983). Learning to read: The great debate (updated ed.). New York, NY:

    McGraw-Hill.

Chaney, C. (1994). Language development, metalinguistic awareness, and emergent

    literacy skills of 3-year-old children in relation to social class. Applied

    PsychoLinguistics, 15, 371–394, http://dx.doi.org/10.1017/S0142716400004501.

Chiappe, P., Stringer, R., Siegel, L. S., & Stanovich, K. E. (2002). Why the timing

    deficit hypothesis does not explain reading disability in adults. Reading and

    Writing, 15, 73–107.

Chiu, M., & McBride-Chang, C. (2010). Family and reading in 41 countries: Differences

    across cultures and students. *Scientific Studies of Reading*, *14*(6), 514-543.

Cooper, H., Nye, B., Charlton, K., Lindsay, J., & Greathouse, S. (1996). The effects of

    summer vacation on achievement test scores: A narrative and meta-analytic

    review. Review of Educational Research, 66, 227–268.

Cormier, P. (2006). Connaissance du nom des lettres chez des enfants francophones de

    4, 5 et 6 ans au Nouveau-Brunswick. Education et Francophonie, 34, 5–27.

Coskie, T. L. & Place, N. A. (2008). The National Board certification process as

    professional development: The potential for changed literacy practice. *Teaching

    and Teacher Education*, *24(7),* 1893-1906. doi:10.1016/j.tate.2008.02.005

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods

    approaches. 4th ed. John W. Creswell*. Thousand Oaks, Calif.: SAGE

    Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods

    research. 2nd ed. John W. Creswell, Vicki L. Plano Clark*. Los Angeles: SAGE

    Publications, [2011].

Cuban, L. (2001). How can I fix it? Finding solutions and managing dilemmas: An

educator's road map. New York: Teacher's College Press.

Cummine, J., Szepesvari, E., Chouinard, B., Hanif, W., & Georgiou, G. K. (2014). A

functional investigation of RAN letters, digits, and objects: How similar are

they? *Behavioural Brain Research, 275,* 157–165.

http://dx.doi.org/10.1016/j.bbr.2014.08.038

Cunningham, A. E. & Stanovich, K. E. (1997). Early reading acquisition and its relation

to reading experience and ability 10 years later. *Developmental Psychology*, *33*,

934-945. doi:10.1037/0010-1649.33.6.934

Decker, S. L., Roberts, A. M., & Englund, J. A. (2013). Cognitive predictors of rapid

picture naming. *Learning and Individual Differences, 25,* 141–149.

http://dx.doi.org/10.1016/j.lindif.2013.03.009

de Jong, P. F. (2011). What discrete and serial rapid automatized naming can reveal

about reading. Scientific Studies of Reading, 15, 314–337.

Denckla, M. B. & Rudel, R. G. (1976a). Naming of objects by dyslexic and other

learning disabled children. *Brain Lang,* 3, 1–15.

Denckla, M. B. & Rudel, R. G. (1976b). Rapid automatized naming (R.A.N): Dyslexia

differentiated from other learning disabilities. *Neuropsychologia,* 14, 471–79.

Denton, K., West, J., & Walston, J. (2003). *Reading—Young children's achievement and

classroom experiences: Findings from the condition of education, 2003*.

Washington, DC: National Center for Education Statistics.

Dodge, D. T., Colker, L. J., & Heroman, C. (2002). *The creative curriculum for preschool* (4th ed.). Washington, DC: Teaching Strategies Inc.

Dohan, D. & Sanchez-Jankowski, M. (1998). Using computers to analyze ethnographic field data: Theoretical and practical considerations. *Annual review of Sociology*, *24*(1), 477-498.

Dougherty Stahl, K. A. (2015). New insights about letter learning. *The Reading Teacher*, 68 (4), 261-265.

Drouin, M., Horner, S. L., & Sondergeld, T. A. (2012). Alphabet knowledge in preschool: A Rasch model analysis. *Early Childhood Research Quarterly, 27*(3), 543-554. doi:10.1016/j.ecresq.2011.12.008

Duncan, G. J., Yeung, W. J., Brooks-Gunn, J., & Smith, J. R. (1998). How much does childhood poverty affect the life chances of children? *American Sociological Review*, 63(3), 406–423. doi:10.2307/2657556

Duncan, L. G. & Seymour, P. H. K. (2000). Socioeconomic differences in foundation-level literacy. *British Journal of Psychology*, 91, 145–166.

Ecalle, J. (2004). Les connaissances des lettres et l'écriture du prénom chez l'enfant français avant l'enseignement formel de la lecture–écriture. Psychologie Canadienne, 45, 111–119.

Eisenhart, M.A. (1991) Conceptual frameworks for research circa 1991: Ideas from a cultural anthropologist: Implications for mathematics education researchers. Proceedings of the 13th Annual Meeting of the North American Chapter of the

International Group for the Psychology of Mathematics Education, Blacksburg,

Vol. 1, 202-219.

Ellefson, M. R., Treiman, R., & Kessler, B. (2009). Learning to label letters by sounds or

names: A comparison of England and the United States. *Journal of Experimental*

Child Psychology, *102*323-341. doi:10.1016/j.jecp.2008.05.008

Entwisle, D. R., & Alexander, K. L. (1992). Summer setback: Race, poverty, school

composition, and mathematics achievement in the first two years of school.

American Sociological Review, 57, 72–84.

Entwisle, D. R., & Alexander, K. L. (1996). Further comments on seasonal learning. In

A. Booth, & J. F. Dunn (Eds.), Family-school links: How do they affect

educational outcomes? (pp. 125–136). Mahwah, NJ: Lawrence Erlbaum

Associates.

Evans, M., Bell, M., Shaw, D., Moretti, S., & Page, J. (2006). Letter names, letter

sounds, and phonological awareness: An examination of kindergarten children

across letters and of letters across children. *Reading and Writing*, *19* (9), 959-

989. doi: 10.1007/s11145-006- 9026

Evans, M. A., Shaw, D., & Bell, M. (2000). Home literacy activities and their influence

on early literacy skills. *Canadian Journal Of Experimental Psychology*, *54*(2),

65-75.

Ferreiro, E. & Teberosky, A. (1982). *Literacy before schooling.* Exeter, N.H.:

Heinemann Educational Books. Retrieved from http://p2048-lib-

ezproxy.tamu.edu.ezproxy.library.tamu.edu/login?url=http://search.ebscohost.co

m.ezproxy.library.tamu.edu/login.aspx?direct=true&db=cat03318a&AN=tamug.
390164&site=eds-live

Fielding, L., Kerr, N., & Rosier, P. (2007). *Annual growth for all students, catch-up
growth for those who are behind.* Kennewick, WA: New Foundation Press.

Foulin, J. N. (2005). Why is letter-name knowledge such a good predictor of learning to
read? *Reading and Writing*. *18*(2), 109–155.

Frechtling, J., Bozeman, H., Hoover, K., Zhang, X., Rieder, S., & McInerney, J. (2007).
An independent evaluation of treasures reading triumphs, and treasure chest in a
rural school district year 1 program implementation 2006-2007. Retrieved from
https://www.mheonline.com/research/assets/products/45fbc6d3e05ebd93/Studyin
g_Effectiveness_of_Treasures_in_Rural_Schools.pdf

Frontline Educational Products, LLC. (2003). *Frontline phonics*. Available from
http://www.frontlinephonics.com.

Fugate, M. H. (1997). Letter training and its effect on the development of beginning
reading skills. School Psychology Quarterly, 12, 170–192.

Gallagher, A., Frith, U., & Snowling, M. J. (2000). Precursors of literacy delay among
children at genetic risk of dyslexia. *Journal of Child Psychology and Psychiatry,
and Allied Disciplines*, *41*(2), 203-213.

General Information (2010) Retrieved August 29, 2017 from City of Lancaster Texas
website, http://www.lancaster-tx.com/1016/General-Information

Georgiou, G. K., Parrila, R., Cui, Y., & Papadopoulos, T. C. (2013). Why is rapid
automatized naming related to reading? *Journal of Experimental Child
Psychology, 115,* 218–225. http://dx.doi.org/10.1016/j.jecp.2012.10.015

Georgiou, G. K., Parrila, R., & Kirby, J. R. (2006). Rapid naming speed components and
early reading acquisition. *Scientific Studies of Reading*, *10*(2), 199-220.
doi:10.1207/s1532799xssr1002_4

Georgiou, G. K., Parrila, R., & Kirby, J. R. (2009). RAN Components and Reading
Development From Grade 3 to Grade 5: What Underlies Their Relationship?
Scientific Studies of Reading, 13(6), 508–534.

Georgiou, G. K., Parrila, R., Kirby, J. R., & Stephenson, K. (2008). Rapid naming
components and their relationship with phonological awareness, orthographic
knowledge, speed of processing, and different reading outcomes. *Scientific
Studies of Reading, 12,* 325–350. http://dx.doi.org/10.1080/10888430802378518

Guskey, T. R. (2000). *Evaluating professional development. Thomas R. Guskey;
foreword by Dennis Sparks* Thousand Oaks, Calif.: Corwin Press.

Halle, T. G., Kurtz-Costes, B., & Mahoney, J. L. (1997). Family influences on school
achievement in low-income, African American children. *Journal of Educational
Psychology, 89*, 527–537.

Hart, B. & Risley, T. R. (1995). *Meaningful differences in the everyday experience of
young American children*. Baltimore, MD: Brookes.

Hayashi, Y., Schmidt, A. C., & Saunders, K. J. (2013). Effects of letter- identification

    training on letter naming in prereading children. *Journal of Applied Behavior*

    Analysis, *46*(4), 838-843. doi:10.1002/jaba.90

Hayes, K. J. (1962). Genes, drives, and intellect. Psychological Reports, 10, 299–342.

Hecht, S. A., Burgess, S. R., Torgesen, J. K., Wagner, R. K., & Rashotte, C. A. (2000).

    Explaining social class differences in growth of reading skills from beginning

    kindergarten through fourth-grade: The role of phonological awareness, rate of

    access, and print knowledge. Reading and Writing: An Interdisciplinary Journal,

    12, 99–127.

Helal, S., & Weil-Barais, A. (2015). Cognitive determinants of early letter knowledge.

    European Early Childhood Education Research Journal, *23*(1), 86-98.

    Heyns, B. (1978). Summer learning and the effects of schooling. New York:

    Academic Press.

Hohmann, M., & Weikart, D. P. (1995). *Active learning practices for preschool and*

    child care programs: Educating young children. Ypsilanti, MI: High/Scope

    Press.

Hood, M., Conlon, E., & Andrews, G. (2008). Preschool home literacy practices and

    children's literacy development: A longitudinal analysis. Journal of Educational

    Psychology, 100, 252–271. doi:10.1037/0022-0663.100.2.252.

Hoorens, V. & Todorova, E. (1988). The name letter effect: Attachment to self or

    primacy of own name writing? *European Journal of Social Psychology*, *18*, 365–

    368.

Horowitz, J. A. (1995). A conceptualization of parenting. *Marriage and Family Review, 20(1–2),* 43–70.

Huang, F. L., Tortorelli, L. S., & Invernizzi, M. A. (2014). An investigation of factors associated with letter-sound knowledge at kindergarten entry. *Early Childhood Research Quarterly, 29* (2), 182-192. doi: 10.1016/jecresq.2014.02.001

Istation (2014). Celebrating student success. Retrieved from http://www.Istation.com/About/Press20140328

Istation® (2016). Texas SUCCESS. Retrieved from http://www.rti4success.org/related-rti-topics

Jones, C. D., Clark, S. K., & Reutzel, D. R. (2013). Enhancing alphabet knowledge instruction: Research implications and practical strategies for early childhood educators. *Early Childhood Education Journal*, *41*(2), 81-89. doi:10.1007/s10643-012-0534-9

Jones, C. D. & Reutzel, D. R. (2012). Enhanced alphabet knowledge instruction: Exploring a change of frequency, focus and distributed cycles of review. *Reading Psychology*, *33* (5), 448–464. doi: 10.1080/02702711.2010.545260

Justice, L. M., Pence, K., Bowles, R. B., & Wiggins, A. (2006). An investigation of four hypotheses concerning the order by which 4-year-old children learn the alphabet letters. *Early Childhood Research Quarterly*, *21* (3), 374-389. doi:10.1016/j.ecresq.2006.07.010

Kail, R., Hall, L., & Caskey, B. (1999). Processing speed, exposure to print, and naming speed. *Applied Psycholinguistics, 20*(2), 303-314.

Kieffer, M. J. (2012). Before and after third grade: Longitudinal evidence for the shifting role of socioeconomic status in reading growth. *Reading and Writing: An Interdisciplinary Journal*, *25*(7), 1725-1746.

Kirby, J. R., Georgiou, G. K., Martinussen, R., & Parrila, R. (2010). Naming speed and reading: From prediction to instruction. Reading Research Quarterly, 45, 341–362.

Kirby, J. R., Parrila, R., & Pfeiffer, S. (2003). Naming speed and phonological awareness as predictors of reading development. *Journal of Educational Psychology, 95,* 453–464. http://dx.doi.org/10.1037/0022-0663.95.3.453

Korat, O. (2005). Contextual and non-contextual knowledge in emergent literacy development: A comparison between children from low SES and middle SES communities. Early Childhood Research Quarterly, 20, 220–223, http://dx.doi.org/10.1016/j.ecresq.2005.04.009.

Lee, J., & Park, O. (2007). Adaptive instructional systems. In J. M. Spector, M. D. Merrill, J. V. Merrienboer, & M. P. Driscoll (Eds.), Handbook of research on educational communications and technology (3rd ed., pp. 469–484). Mahwah, NJ: Lawrence Erlbaum Associates.

Lervåg, A., & Hulme, C. (2009). Rapid automatized naming (RAN) taps a mechanism that places constraints on the development of early reading fluency. *Psychological Science, 20,* 1040–1048. http://dx.doi.org/10.1111/j.1467-9280.2009.02405.x

Levin, I., Shatil-Carmon, S., & Asif-Rave, O. (2006). Learning of letter names and sounds and their contribution to word recognition. Journal of Experimental Child Psychology, 93, 139–165. doi: 10.1016/j.jecp.2005.08.002.

Liu, C., & Georgiou, G. K. (2017). Cognitive and environmental correlates of rapid automatized naming in Chinese kindergarten children. *Journal of Educational Psychology*, *109*(4), 465-476. doi:10.1037/edu0000151

Logan, J. A. R., Schatschneider, C., & Wagner, R. K. (2011). Rapid serial naming and reading ability: The role of lexical access. Reading and Writing, 24, 1–25.

Lonigan, C. J. (2003). Development and promotion of emergent literacy skills in children at-risk of reading difficulties. In B. Foorman (Ed.), Preventing and remediating reading difficulties: Bringing science to scale (pp. 23–50). Baltimore, MA: York Press.

Lonigan, C. J. (2004). Family literacy and emergent literacy programs. In B. Wasik (Ed.), Handbook on family literacy: Research and services (pp. 57–82). Hillsdale, NJ: Erlbaum.

Lonigan, C. J., Burgess, S. R., & Anthony, J. L. (2000). Development of emergent literacy and early reading skills in preschool children: Evidence from a latent-variable longitudinal study. *Developmental Psychology*, 36, 613–696.

Martini, F. & Sénéchal, M. (2012). Learning Literacy Skills at Home: Parent Teaching, Expectations and Child Interest. *Canadian Journal of Behavioral Sciences, 44*, 210-221. doi: 10.1037/a0026758

Mathes, P., Torgesen, J., & Herron, J. (2016). Istation's indicators of progress (ISIP)

early reading technical manual (Report No. 4). Retrieved from

http://www.Istation.com/Content/downloads/studies/er_technical_report.pdf

McBride-Chang, C. (1999). The abcs of the abcs: The development of letter-name and

letter-sound knowledge. *Merrill-Palmer Quarterly*, *45* (2), 285-308.

McCardle, P., Scarborough, H. S., & Catts, H. W. (2001). Predicting, explaining, and

preventing children's reading difficulties. *Learning Disabilities Research and*

Practice, 16, 230–239.

McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American*

Psychologist, 53(2), 185–204. doi:10.1037/0003-066X.53.2.185

Molfese, V. J., Modglin, A. A., Beswick, J. L., Neamon, J. D., Berg, S. A., Berg, C. J.,

& Molnar, A. (2006). Letter knowledge, phonological processing, and print

knowledge: Skill development in nonreading preschool children. *Journal of*

Learning Disabilities, 39 (4), 296-305.

Moore, K. D. (2014). *Effective instructional strategies: From theory to practice*. Sage

Publications.

Morris, D., Bloodgood, J. W., Lomax, R. G., & Perney, J. (2003). Developmental steps

in learning to read: A longitudinal study in kindergarten and first grade. *Reading*

Research Quarterly, *38*(3), 302-328. doi:10.1598/RRQ.38.3.1

Muter, V., Hulme, C., Snowling, M. J., & Stevenson, J. (2004). Phonemes, rimes,

vocabulary, and grammatical skills as foundations of reading development:

Evidence from a longitudinal study. *Developmental Psychology*, *40*, 665–681.

Närhi, V., Ahonen, T., Aro, M., Leppäsaari, T., Korhonen, T. T., Tolvanen, A., &

    Lyytinen, H. (2005). Rapid serial naming: Relations between different stimuli

    and neuropsychological factors. *Brain and Language, 92,* 45–57.

    http://dx.doi.org/10.1016/j.bandl.2004.05.004

National Center for Educational Statistics (2010). Teachers' use of educational

    technology in U.S. public schools: 2009. Retrieved from

    http://nces.ed.gov/pubs2010/2010040.pdf.

National Center for Educational Statistics (2017). Reading performance. Retrieved

    August 5, 2017, from https://nces.ed.gov/programs/coe/indicator_cnb.asp

National Early Literacy Panel. (2008). *Developing early literacy: Report of the national*

    early literacy panel. Washington, DC: National Institute for Literacy. Retrieved

    from http://www.nifl.gov/earlychildhood/NELP/NELPreport.html

National Research Council. (1998). Preventing reading difficulties in young children.

    Washington, DC: National Academy Press.

Neumann, M., Hood, M., & Neumann, D. (2009). The scaffolding of emergent literacy

    skills in the home environment: A case study. *Early Childhood Education*

    Journal, *36*(4), 313-319. doi:10.1007/s10643-008-0291-y

Niklas, F. & Schneider, W. (2014). With a little help: Improving kindergarten children's

    vocabulary by enhancing the home literacy environment. *Reading and Writing*,

    doi:10.1007/s11145-014-9534-z

Norton, E. S. & Wolf, M. (2012). Rapid automatized naming (RAN) and reading

    fluency: Implications for understanding and treatment of reading disabilities.

    Annual Reviews of Psychology, 63, 427–453.

Nuttin, J. M. (1985). Narcissism beyond gestalt and awareness: The name letter effect.

    European Journal of Social Psychology, *15*, 353–361.

Nuttin, J. M. (1987). Affective consequences of mere ownership: The name letter effect

    in twelve european languages. *European Journal of Social Psychology*, *17*, 381–

    402.

O'Connor, R. E., & Jenkins, J. R. (1999). Prediction of reading disabilities in

    kindergarten and first grade. *Scientific Studies of Reading, 3*, 159–197.

O'Donnell, J., & Saunders, K. J. (2003). Equivalence relations in individuals with

    language limitations and mental retardation. Journal of the Experimental

    Analysis of Behavior, 80, 131–157. doi: 10.1901/jeab.2003.80-131

Ogunnaike, Y. A. (2015). Early childhood education and human factor: Connecting

    theories and perspectives. *Review of Human Factor Studies*, *21*(1), 9-26.

Parrila, R., Kirby, J. R., & McQuarrie, L. (2004). Articulation rate, naming speed, verbal

    short-term memory, and phonological awareness: Longitudinal predictors of

    early reading development. *Scientific Studies of Reading, 8,* 3–26.

    http://dx.doi.org/10.1207/s1532799xssr0801_2

Pashler, H., Bain, P., Bottge, B., Graesser, A., Koedinger, K., McDaniel, M., et al.

    (2007). *Organizing instruction and study to improve student learning* (NCER

2007-2004). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education.

Phillips, B. M., Piasta, S. B., Anthony, J. L., Lonigan, C. J., & Francis, D. J. (2012). IRTs of the ABCs: Children's letter name acquisition. *Journal of School Psychology*, *50*(4), 461–481. doi:10.1016/j.jsp.2012.05.002

Piasta, S. B. (2014). Moving to assessment-guided differentiated instruction to support young children's alphabet knowledge. *Reading Teacher*, *68*(3), 202-211.

Piasta, S. B., Phillips, B. M., Williams, J. M., Bowles, R. P., & Anthony, J. L. (2016). Measuring Young Children's Alphabet Knowledge: Development and Validation of Brief Letter-Sound Knowledge Assessments. *The Elementary School Journal*, *116*(4), 523-548.

Piasta, S. B., Purpura, D. J., & Wagner, R. K. (2010). Fostering alphabet knowledge development: A comparison of two instructional approaches. *Reading and Writing, 23*, 607–626.

Piasta, S. B. & Wagner, R. K. (2010). Developing early literacy skills: A meta-analysis of alphabet learning and instruction. *Reading Research Quarterly*, *45* (1), 8-38. doi: 10.1598/RRQ.45.1.2

Prein, G., Kuckartz, U., Roller, E., Ragin, C., & Kelle, U. (1995). Computers and triangulation. Introduction: Between quality and quantity. *Computer-aided qualitative data analysis: Theory, methods and practice*, 152-157.

Protopapas, A., Altani, A., & Georgiou, G. K. (2013). Development of serial processing in reading and rapid naming. *Journal of Experimental Child Psychology*, *116,* 914-929. doi:10.1016/j.jecp.2013.08.004

Puolakanaho, A., Ahonen, T., Aro, M., Eklund, K., Leppnen, P. H. T., Poikkeus, A.-M., . . . Lyytinen, H. (2007). Very early phonological and language skills: Estimating individual risk of reading disability. *Journal of Child Psychology and Psychiatry, 48,* 923–931. doi:10.1111/j.1469-7610.2007.01763.x

Putman, R. S. (2016). Technology versus teachers in the early literacy classroom: An investigation of the effectiveness of the Istation integrated learning system. *Educational Technology Research And Development*, doi:10.1007/s11423-016-9499-5

Raikes, H., Alexander Pan, B., Luze, G., Tamis-LeMonda, C. S., Brooks-Gunn, J., Constantine, J., Banks Tarullo, L., Raikes, H. A., & Rodriguez, E. T. (2006), Mother–child bookreading in low-income families: Correlates and outcomes during the first three years of life. *Child Development*, *77*, 924–953.

Raz, I. S. & Bryant, P. E. (1990). Social background, phonological awareness, and children's reading. British Journal of Developmental Psychology, 8, 209–225.

Riley, J. L. (1996). The ability to label the letters of the alphabet at school entry: A discussion on its value. *Journal of Research in Reading*, 19, 87–101.

Ritchey, K. D. (2008). Assessing letter sound knowledge: A comparison of letter sound fluency and nonsense word fluency. *Exceptional Children*, *74*(4), 487-506.

Ritchey, K. D., & Speece, D. L. (2006). From letter names to word reading: The nascent

    role of sublexical fluency. *Contemporary Educational Psychology*, 31, 301-327.

    doi:10.1016/j.cedpsych.2005.10.001

Robins, S., Ghosh, D., Rosales, N., & Treiman, R. (2014). Letter knowledge in parent-

    child conversations: Differences between families differing in socio-economic

    status. *Frontiers in Psychology, 5* doi:10.3389/fpsyg.2014.00632

Rohrer, D. & Pashler, H. (2010). Recent research on human learning challenges

    conventional instructional strategies. *Educational Researcher*, *39*(5), 406–412.

Ryan, R. M., Fauth, R. C., & Brooks-Gunn, J. (2006). Childhood poverty: Implications

    for school readiness and early childhood education. In B. Spodek & O. N.

    Saracho (Eds.), Handbook of research on the education of children (2nd ed., pp.

    323–346.) Mahwah, NJ: Erlbaum.

Saldana, J. (2009). An introduction to codes and coding. *The coding manual for*

    qualitative researchers, 1-31.

Sander, E. K. (1972). When are speech sounds learned? *Journal of Speech and Hearing*

    Disorders, *37*, 55–63.

Savage, R., Pillay, V., & Melidona, S. (2007). Deconstructing rapid automatized

    naming: Component processes and the prediction of reading difficulties.

    Learning and Individual Differences, 17, 129–146.

    http://dx.doi.org/10.1016/j.lindif.2007.04.001

Scarborough, H. S. (1998). Early identification of children at risk for reading disabilities: Phonological awareness and some other promising predictors. In B. K. Shapiro, A. J. Capute, & B. Shapiro (Eds.), Hillsdale, NJ: 77-101.

Schatschneider, C., Fletcher, J. M., Francis, D. J., Carlson, C. D., & Foorman, B. R. (2004). Kindergarten prediction of reading skills: A longitudinal comparative analysis. *Journal of Educational Psychology*, *96*, 265–282.

Senechal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. Journal for the Scientific Study of Reading, 10, 59–87. doi:10.1007/s1532799xssr1001_4.

Senechal, M. (2010). Child language and literacy development at home. In B. H. Wasik & B. Van Horn (Eds.), Handbook on family literacy (pp. 38–50). New York: Routledge.

Senechal, M., & LeFevre, J. A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. Child Development, 73, 445–460. doi:10.1111/1467-8624.00417.

Senechal, M., LeFevre, J. A., Thomas, E., & Daley, K. (1998). Differential effects of home literary experiences on the development of oral and written language. Reading Research Quarterly, 32, 96–116.

Share, D. L. (2004). Knowing letter names and learning letter sounds: A causal connection. *Journal of Experimental Child Psychology*, *88*, 213–233.

Share, D. L., Jorm, A. F., Maclean, R., & Matthews, R. (1984). Sources of individual

    differences in reading acquisition. *Journal of Educational Psychology*, 76, 1309–

    1324.

Shonkoff, J. P., & Phillips, D. A. (Eds.). (2000). From neurons to neighborhoods: The

    science of early childhood development. Washington, DC: National Academy

    Press.

Smith, J. (2000). Singing and songwriting support early literacy instruction. *Reading*

    Teacher, 53, 646–651.

Smythe, P. C., Stennett, R. G., Hardy, M., & Wilson, H. R. (1970–71). Developmental

    patterns in elemental skills knowledge of upper-case and lower-case letter names.

    Journal of Reading Behavior, 3, 24–33.

Snow, C. E., Burns, M. S., & Griffin, P. (1998). *Preventing reading difficulties in young*

    children. Washington, DC: National Academy Press.

Snow, C. E., & Matthews, T. J. (2016). Reading and Language in the Early Grades

    Reading and Language in the Early Grades. *Future of Children*, *26*(1), 57-74.

Song, S., Georgiou, G. K., Su, M., & Hua, S. (2016). How well do phonological

    awareness and rapid automatized naming correlate with reading accuracy and

    fluency in Chinese? A meta-analysis. *Scientific Studies of Reading, 20,* 99–123.

    http://dx.doi.org/10.1080/10888438.2015.1088543

SRA/McGraw-Hill (2003). *Open Court Reading Pre-K*. Columbus, OH: Author.

Stake, R. E. (2010). *Qualitative research: Studying how things work.* New York:

    Guilford Press.

Stanovich, K. E., Feeman, D. J., & Cunningham, A. E. (1983). The development of the

    relation between letter-naming speed and reading ability. Bulletin of the

    Psychonomic Society, 21, 199–202.

Stoel-Gammon, C. (1987). Phonological skills of 2-year-olds. *Language, Speech, and*

    Hearing Services in Schools, *18*, 323–329.

Storch, S. A. & Whitehurst, G. J. (2002). Oral language and code-related precursors to

    reading: Evidence from a longitudinal structural model. Developmental

    Psychology, 38, 937–947. doi:10.1037//0012-1649.38.6.934

Swanson, L. & Kim, K. (2007). Working memory, short-term memory, and naming

    speed as predictors of children's mathematical performance. *Intelligence*, *35*151-

    168. doi:10.1016/j.intell.2006.07.001

Texas Education Agency (2016). Accountability Summary for Lancaster Elementary.

    Retrieved from

    https://rptsvr1.tea.texas.gov/perfreport/account/2016/srch.html?srch=C

Tomlinson, C. A. (2000). What is differentiated instruction. *Fundamentals of gifted*

    education: Considering multiple perspectives, 287-300.

Torppa, M., Lyytinen, P., Erskine, J., Eklund, K., & Lyytinen, H. (2010). Language

    development, literacy skills, and predictive connections to reading in Finnish

    children with and without familial risk for dyslexia. *Journal of Learning*

    Disabilities, 43, 308 –321. doi:10.1177/0022219410369096

Torppa, M., Poikkeus, A.-M., Laakso, M.-L., Eklund, K., & Lyytinen, H. (2006).

    Predicting delayed letter knowledge development and its relation to Grade 1

reading achievement among children with and without familial risk for dyslexia. *Developmental Psychology, 42,* 1128–1142. doi:10.1037/0012-1649.42.6.1128

Treiman, R. (2006). Knowledge about letters as a foundation for reading and spelling. Handbook of Orthography and Literacy, Mahwah, NJ: Erlbaum, 581–599.

Treiman, R. & Broderick, V. (1998). What's in a name? Children's knowledge about the letters in their own names. *Journal of Experimental Child Psychology*, *70*, 97–116.

Treiman, R., Kessler, B., & Pollo, T. C. (2006). Learning about the letter name subset of the vocabulary: Evidence from us and brazilian preschoolers. *Applied Psycholinguistics*, *27*(2), 211-227. doi:10.1017/S0142716406060255

Treiman, R., Levin, I., & Kessler, B. (2007). Learning of letter names follows similar principles across languages: Evidence from hebrew. Journal of Experimental Child Psychology, 70, 97–116.

Treiman, R., Tincoff, R., & Richmond-Welty, E. D. (1997). Beyond zebra: Preschoolers' knowledge about letters. *Applied Psycholinguistics*, *18*, 391–409.

Treiman, R., Tincoff, R., Rodriguez, K., Mouzaki, A., & Francis, D. J. (1998). The foundations of literacy: Learning the sounds of letters. *Child Development*, *69*, 1524–1540.

Tunmer, W. E., Herriman, M. J., & Nesdale, A. R. (1988). Metalinguistic abilities and beginning reading. *Reading Research Quarterly*, 23, 134–158.

Ukrainetz, T. A., Ross, C. L., & Harm, H. M. (2009). An investigation of treatment scheduling for phonemic awareness with kindergartners who are at risk for

reading difficulties. *Language, Speech & Hearing Services in Schools*, *40*(1), 86-100 15p. doi:0161-1461(2008/07-0077)

Vaessen, A., Gerretsen, P., & Blomert, L. (2009). Naming problems do not reflect a second independent core deficit in dyslexia: Double deficits explored. *Journal of Experimental Child Psychology, 103,* 202–221. http://dx.doi.org/10.1016/j.jecp.2008.12.004

van den Boer, M., van Bergen, E., & de Jong, P. F. (2014). Underlying skills of oral and silent reading. *Journal of Experimental Child Psychology, 128,* 138–151. http://dx.doi.org/10.1016/j.jecp.2014.07.008

Van Den Bos, K. P., Zijlstra, B. J. H., & van den Broeck, W. (2003). Specific relations between alphanumeric-naming speed and reading speeds of monosyllabic and multisyllabic words. *Applied Psycholinguistics, 24,* 407–430. http://dx.doi.org/10.1017/S0142716403000213

Veraksa, N., Shiyan, O., Shiyan, I., Pramling, N., & Pramling-Samuelsson, I. (2016). Communication between teacher and child in early child education: Vygotskian theory and educational practice / La comunicación entre profesor y alumno en la educación infantil: la teoría vygotskiana y la práctica educativa. *Infancia y Aprendizaje, 39*(2), 221-243. doi:10.1080/02103702.2015.1133091

Villaume, S. K. & Wilson, L. C. (1989). Preschool children's explorations of letters in their own names. Applied Psycholinguistics, 10, 283–300.

von Drehle, D. (2010). The case against summer vacation. Time Magazine, 176(5), 36–42.

von Stumm, S. (2012). You are what you eat? Meal type, socio-economic status and cognitive ability in childhood. Intelligence, 40, 576–583.

von Stumm, S. & Plomin, R. (2015). Socioeconomic status and the growth of intelligence from infancy through adolescence. *Intelligence*, *48,* 30-36. doi:10.1016/j.intell.2014.10.002

Vygotsky, L. (1978). Mind in society. The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Walsh, D. J., Price, G. G., & Gillingham, M. G. (1988). The critical but transitory importance of letter naming. *Reading Research Quarterly*, 23(1), 108-102. doi:10.2307/747907

Whitehurst, G. J. & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development*, *69*, 848-872. doi:10.2307/1132208

Whitehurst, G. J. & Lonigan, C. J. (2001). Emergent literacy: Development from prereaders to readers. In S. B. Neuman, & D. K. Dickinson (Eds.), *Handbook of early literacy research* (pp. 11-29). New York, NY: Guilford Press.

Wilson, N., Grisham, D., & Smetana, L. (2009). Investigating content area teachers' understanding of a content literacy framework: A yearlong professional development initiative. *Journal of Adolescent & Adult Literacy, 52*(8), 708-718. Retrieved from http://www.jstor.org.ezproxy.library.tamu.edu/stable/27654333

Wise, J.C., Sevcik, R.A., Morris, R.D., Lovett, M.W. & Wolf, M. (2007). The growth of phonological awareness by children with reading disabilities: A result of

semantic knowledge or knowledge of grapheme–phoneme correspondences? Scientific Studies of Reading, 11, 151–164. doi:10.1080/10888430709336557.

Wolf, M. & Bowers, P. G. (1999). The double-deficit hypothesis for the developmental dyslexias. Journal of Educational Psychology, 91, 415–438.

Wolf, M. & Denckla, M. B. (2005). *RAN/RAS: Rapid automatized naming and rapid alternating stimulus tests.* Austin, TX: Pro-Ed

Wolf, M., O'Rourke, A. G., Gidney, C., Lovett, M., Cirino, P. T., & Morris, R. (2002). The second deficit: An investigation of the independence of phonological and naming-speed deficits in developmental dyslexia. Reading and Writing, 15, 43–72.

Woodrome, S. E., & Johnson, K. E. (2009). The role of visual discrimination in the learning-to-read process. *Reading & Writing*, *22*(2), 117-131. doi:10.1007/s11145-007-9104-8

APPENDIX A

## ISTATION® LETTER KNOWLEDGE DISTRICT RESULTS - SEPTEMBER

2016

Summary

ISIP™ Early Reading results for Lancaster ISD

2016/2017 School Year
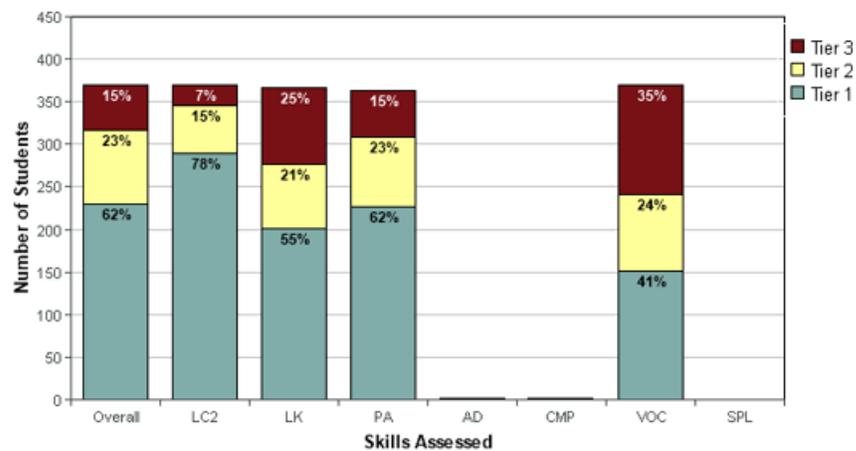
Kindergarten - September 2016

Letter Knowledge Results

⬇ View as CSV   View Skill Growth Report for Letter Knowledge

| Letter Knowledge Assessed for Kindergarten in Lancaster ISD							
Schools	**Total Students**	**Percentage / Number of Students by Tier**					
		Tier 3		**Tier 2**		**Tier 1**	
[+] Beltline Elementary School	67	22%	15	19%	13	58%	39
[+] J D Hall Learning Center							
[+] Rolling Hills Elem School	55	27%	15	27%	15	45%	25
[+] Houston Elementary	66	21%	14	20%	13	59%	39
[+] Lancaster Elementary School	62	10%	6	27%	17	63%	39
[+] Gw Carver 6th Gr Stem Lrng Ctr							
[+] West Main Elementary School	23	30%	7	22%	5	48%	11
[+] Rosa Parks-Millbrook School	57	30%	17	12%	7	58%	33
[+] Lancaster Elsie Robertson Ms							
[+] Pleasant Run Elementary School	37	43%	16	16%	6	41%	15
All Schools	367	25%	90	21%	76	55%	201

150

ISTATION® LETTER KNOWLEDGE CAMPUS RESULTS - SEPTEMBER 2016

Summary

ISIP™ Early Reading results for Lancaster Elementary School
at Lancaster ISD - 2016/2017 School Year

Kindergarten - September 2016

| Classes	Total Students	Percentage / Number of Students by Tier					
		Tier 3		Tier 2		Tier 1	
[+] Medlock-HMRKN-1	22	5%	1	27%	6	68%	15
[+] Millner-HMRKN-2	20	15%	3	35%	7	50%	10
[+] Raven-HMRKN-3	20	10%	2	20%	4	70%	14
Classes	62	10%	6	27%	17	63%	39

Letter Knowledge Results

View as CSV   View Skill Growth Report for Letter Knowledge

Letter Knowledge Assessed for Kindergarten in Lancaster Elementary School
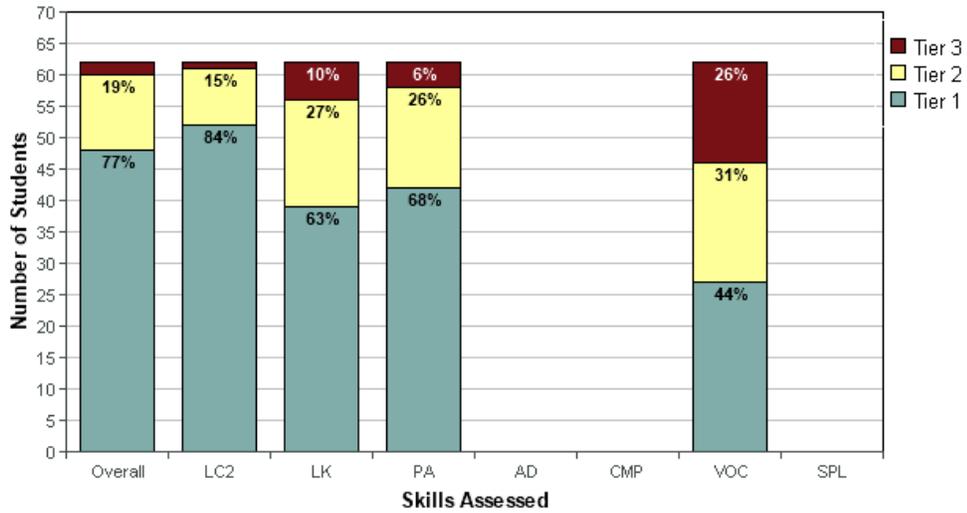
Tabs: Overall Reading | Listening Comprehension | Letter Knowledge | Phonemic Awareness | Alphabetic Decoding | Comprehension | Vocabulary | Spelling

APPENDIX C

ISTATION® LETTER KNOWLEDGE ASSESSMENT FORMAT
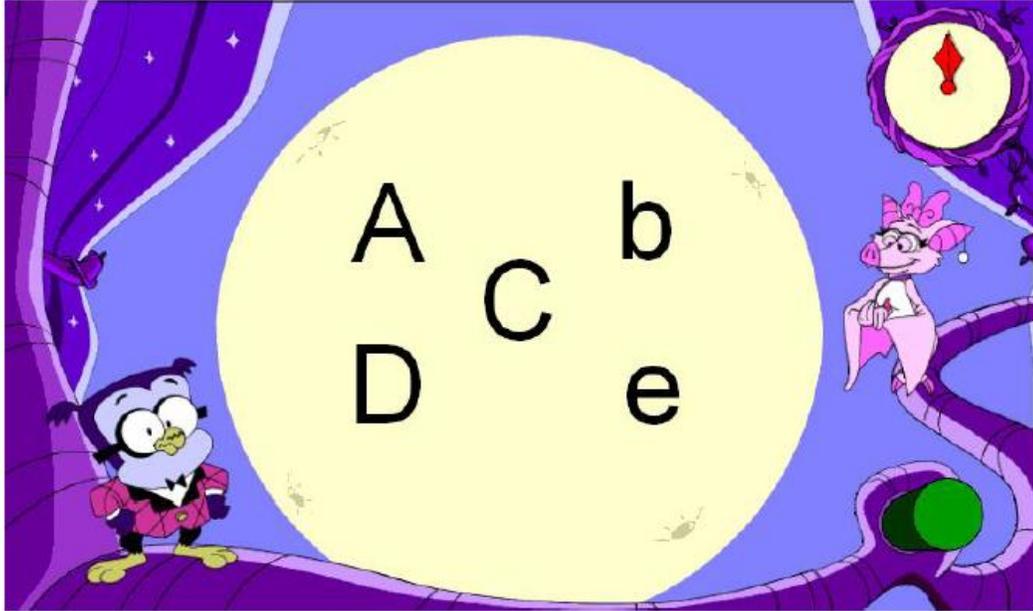
EXAMPLE EAK LESSON PLAN

Lesson Objective: Students will learn the name, sound, and written formation for the uppercase and lowercase letter *T/t.*

Supplies:
Bag of mixed uppercase and lowercase letter T/t
Washable markers and small student whiteboards

Explanation: Tell students: *Today you will be learning the name, sound, and how to write the letter T/t. Learning this letter will help you to read and write many words.*

Letter Name Identification: (~1–2 minutes)

1. *This is the letter T/t. This is the uppercase letter T. This is the lowercase letter t.* (Show the letter, explaining the form.)
2. *Let's practice naming this letter. What is this letter?* (Point to uppercase and lowercase letters in different order at least 3 times asking students to identify the letter name.)

Letter Sound Identification: (~1–2 minutes)

3. *The letter T/t represents the sound /t/. When I say the /t/ sound, I place my tongue & mouth like this.* (Show correct placement of tongue and mouth to produce the letter sound.
Provide explanations/stories/keywords to help students remember the sound.)
4. *Let's practice saying the sound of this letter. The letter T/t represents the /t/ sound. Say the /t/ sound with me . . . /t/, /t/, /t/. What is the sound of the letter t?* (Point to uppercase and lowercase letters in different order at least 3 times asking students to identify the letter sound. Hint: For vowels, teach students the short vowel sound and explain that when reading words the vowel letter represents its name or its sound.)

Recognizing the Letter in Text: (~3 minutes)

5. *Now, let's see if we can find the letter T/t.* (Students locate the uppercase and lowercase letter in text and state the letter name and sound each time the letter is located. There are a number of alternatives for student practice with recognizing the letter in text

such as Sort the Letters.) *There are uppercase and lowercase letter T/t mixed in this bag* (6–8 upper and lower case T/t magnetic letters, foam letters, or dye cuts). *We need to sort these letters into uppercase and lowercase letters.* (Begin with a closed sort and in subsequent review lessons use an open sort.) *I'll put each letter on the board and if it is an uppercase letter T, you say, 'uppercase, T, /t/.' If it is a lowercase letter t, say, 'lowercase, t, /t/.'* (Place letters on whiteboard one at a time for students to identify and sort.)

Producing the Letter Form: (~4–5 minutes)

6. *Let me show you how to write the letter T/t.* (Demonstrate the proper formation of the uppercase and lowercase letter T/t, providing explanation to help students correctly produce the letter.) For example: *The uppercase letter T starts at the top of the line and goes straight down to the bottom of the line. Then make a straight line across the top. Down and across the top. The lowercase letter t also starts at the top of the line and goes straight down to the bottom of the line. Next, make a line that crosses the other line between the middle and top of the line. Down and across the middle.*
7. *Let's practice writing the letter T/t together.* (Pass out small whiteboards for letter dictation. Ask students to write 3–6 dictated uppercase and lowercase letter T/t. Identify which students are proficient and which students need additional help with the letter. Hint: Tasks such as using a rubber stamp and ink to stamp the letter or gluing items to an outline of the letter is not producing the letter form as the form has already been produced and students are not required to think about *how* to create the form.)

APPENDIX E

DISTRICT STAKEHOLDER INTERVIEW QUESTIONS - FALL 2016

1. What has been done within the district to strengthen the instruction in letter recognition?

2. What is your opinion about the effectiveness of previous attempts?

3. Can the percentage of kindergarten students scoring below grade level in letter identification decrease significantly with consistent daily non-sequential upper and lowercase letter practice?

4. What does it mean to have students scoring below grade level in letter identification competency?

APPENDIX F

IRB APPROVAL EMAIL

From: Catherine Higgins <clhiggins@tamu.edu>
Date: Thursday, May 19, 2016 at 3:08 PM
To: Radhika Viruru <viruru@tamu.edu>
Cc: "ahampton89@tamu.edu" <ahampton89@tamu.edu>, "Douglas, Kory" <kodouglas@tamu.edu>
Subject: RE: Revised 2 page IRB statements from the 4 STEM EdD cohort

Hi, Dr. Viruru,

Thanks for providing the summaries. Please note that, in any situations that no IRB application is needed and not submitted, the data cannot be used moving forward for research beyond the entity where the quality improvement exercise is being completed. If the individuals would like to be able to use the data for generalizable knowledge and distribution beyond the university and entity where the quality improvement is being conducted, then an IRB application must be submitted.

Here are comments regarding each summary:

Knight - appears to be within scope of work; quality improvement not research – no IRB submission needed

Let me know if any other information would be helpful.

Best regards,
Cathy

Catherine L. Higgins, Ph.D., CIP, CIM
Director, Human Research Protection Program | Division of Research | Texas A&M University | http://rcb.tamu.edu
Adjunct Associate Professor | Health Policy & Management | School of Public Health | Texas A&M Health Science Center
750 Agronomy Road, Suite 2701, 1186 TAMU, College Station, Texas 77843-1186
Office: 979-458-4117 | Cell: 832-684-6462 | Fax: 979-862-3176 | clhiggins@tamu.edu

APPENDIX G

CLASSROOM OBSERVATION RUBRIC

	5	**4**	**3**	**2**	**1**
Timeframe	The teacher implements the intervention daily for 5 minutes/day.	The teacher implements the intervention daily for 4 minutes/day.	The teacher implements the intervention daily for 3 minutes/day.	The teacher implements the intervention daily for 2 minutes/day.	The teacher implements the intervention daily for 1 minutes/day.
Objective	Teacher discusses the objective for the intervention with students.				Teacher does not discuss the objective for the intervention with students.
Student Engagement	The percentage of students actively participating in the intervention is 85-100%.	The percentage of students actively participating in the intervention is 70-84%.	The percentage of students actively participating in the intervention is 55-69%.	The percentage of students actively participating in the intervention is 40-54%	The percentage of students actively participating in the intervention is 0-39%.

APPENDIX H

TEACHER OBJECTIVE SCRIPT

It is important for you to know the names of each of the letters when you see them no matter the order they are presented. The more that we practice the letter names out of order, the more rapidly that you will be able to identify them. Learning the names of the letters is one of the first steps in learning how to read. You have to make sure that you are following along with me saying each of the letter names and looking at the letter that I am pointing to. We will practice our letters for 5 minutes each day. The goal of the game is for everyone to follow along. There will be someone coming to the class periodically to watch us play this game, and she will be looking to see how well you are all following along. Let's practice together.

APPENDIX I

PARTICIPANT TEACHER INTERVIEW QUESTIONS - JUNE 2017

1. How could this intervention be improved?

2. Do you feel that students benefitted from this intervention? If so, how?

3. If you had the opportunity to do this intervention with students again, what would be something that you would do differently? Why?

4. Describe how the daily intervention was conducted in your classroom?

5. What do you believe was the rationale for reiterating the intervention objective daily with students?

6. What are your thoughts regarding the required 5 minute timeframe?

7. Do you think that the 5-minute timeframe should have been longer or shorter? Why?

8. How did the 5-minute timeframe affect student achievement?

9. What are your thoughts regarding the 10-week implementation timeframe?

10. Do you think that the 10-week timeframe should have been longer or shorter? Why?

11. What are your general overarching thoughts about having participated in this study?

12. How effective was the intervention in improving teachers' classroom instructional delivery and students' assessment scores in the area of letter recognition?

APPENDIX J

WEEK 1 MATRIX

p U L W P K S k Q h N

I z C s X G T y D q n

v m f M t u H Z a d r

g c i V l b E A x J Y

j e R B w F O o g K k

j I O X E N P Q T F R

M n c Y o l B i p V Z

v w U d W J f b G a H

r y C h q t u A L z e

D x s S m K X A g j Q

Week 1

160

WEEK 2 MATRIX

s O G u h r x S X f v

d H N e J V a g B M P

Z c K I F U D y E j t

Y R b n C m o L W Q z

p k I q w T i A a b q

J r K M g Z R w Y o d

V F k p W j n v D f N

S P C L z y H i G I u

x O s B A Q e c U X T

h l E m t c t p W e F

Week 2

z D W f V r R B b C v

u j c o K G l I T n g

O e d L J t y U k H S

E m s Q F Z M A X i h

N p P w Y q a x N M d

F y s i o l R J Q P A

S K V Y h B e X D r c

t f m k a j g v Z L T

w b O n W G x H u I C

p q U E z V T t E S n

Week 3

162

WEEK 4 MATRIX

P w T j S q Y v n H W

E o a K u X c I A l p

y t h d i R F k r D Z

s Q B V z m G b O N x

J f e L C U g M S v d

L A i k Q D n o z w U

H b h G y q g X J I P

u T s F r M c W K V a

m x l e t B C Y Z p f

E j N O R l o a F N y

Week 4

163

APPENDIX N

WEEK 5 MATRIX

S m U F M n x j K z J

k y Q a B l q i o N s

Z R t A e G H b T I Y

c u C E O W X r p L w

h f d V P D v g b K U

s z a R N T n G y A C

M O p v Z i F Q D B X

Y W x u q I c J H L d

P g V r S e E j l t o

w m f K h p q Q c U O

Week 5

```
G Q z y k R s m D L X

C i h d U f o T r A g

t O S p N n b H Z F V

a E q e w J M P B K I

j v x u W Y c l y w Q

W Y j b S U r q x G k

B R L V M Z F v p n A

m u C i z g N K a f H

s I c X e E l o T t J

d P h D O B q j z w r
```

Week 6

I Q a y k R s m D L X

C p h d U f o Z r A j

t O S q N n b H Z F V

a E q e w J N P B K I

j v x u W Y c l y w Q

W Y j b S U r q x G k

B R L X M Z c v p n A

m u C i z g N K a f H

s I c X e E l o T t J

m P k D U B q j z w r

Week 7

166

APPENDIX Q

WEEK 8 MATRIX

```
F  R  b  x  O  u  v  C  z  s  S

G  p  y  o  M  w  d  L  P  I  e

c  g  n  T  k  j  D  X  J  I  Y

t  m  Q  U  A  W  V  h  E  i  f

N  K  a  H  B  r  Z  q  w  E  c

o  I  n  T  P  W  z  Z  J  I  B

x  N  t  G  U  q  y  m  v  e  F

C  X  D  j  K  V  k  A  Y  f  d

M  h  u  r  b  O  a  s  H  Q  g

i  S  L  R  p  L  A  j  e  v  M
```

Week 8

167

APPENDIX R

WEEK 9 MATRIX

```
O h N G F o x E r l c

A X p n U D J g R j w

W i I f M L Y b k u S

B H V d Q Z q a m s C

K y t v T z P e J g d

n q A S G L M e D V x

k X I W r F C t K b E

T f O Q i w v Z s l o

N p R Y Y m P z u h j

H U c a B S z R W T e
```

Week 9

APPENDIX S

WEEK 10 MATRIX

Y	t	S	k	T	b	p	W	r	e	Z
i	V	E	y	s	A	H	D	R	u	x
j	d	P	z	m	v	l	J	g	I	N
w	h	c	B	K	M	F	o	f	n	O
G	L	a	U	C	X	q	Q	Y	z	V
a	u	x	g	y	m	b	I	F	R	q
E	W	e	H	v	Q	p	t	Z	w	h
M	C	X	O	L	K	B	s	J	U	r
S	D	n	o	j	T	A	l	c	i	f
N	k	G	d	P	z	D	i	S	Q	b

Week 10

169