PROMOTING MATHEMATICAL LITERACY IN LATINO CHILDREN THROUGH FAMILY INVOLVEMENT AT SCHOOL AND AT HOME.

Submitted in partial fulfillment of the requirements

For the degree of

MASTER OF EDUCATION

IN CURRICULUM AND LEARNING

EARLY CHILDHOOD

by

Carmen Espinosa

William Paterson University of New Jersey

Wayne, NJ

January 2018

This is a research paper submitted for ELCL 6290-6300, Research in Education I & II, in partial fulfillment of the requirements for the Master's Degree in Education in Curriculum and Learning, Early Childhood Concentration at William Paterson University

ProQuest Number: 10689826

All rights reserved

INFORMATION TO ALL USERS
The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript
and there are missing pages, these will be noted. Also, if material had to be removed,
a note will indicate the deletion.

ProQuest 10689826

Published by ProQuest LLC (2017). Copyright of the Dissertation is held by the Author.

All rights reserved.
This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

WILLIAM PATERSON UNIVERSITY OF NEW JERSEY

PROMOTING MATHEMATICAL LITERACY IN LATINO CHILDREN THROUGH FAMILY INVOLVEMENT AT SCHOOL AND AT HOME.

By

Carmen Espinosa

A Master's Thesis Submitted to the Faculty of

William Paterson University of New Jersey

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF EDUCATION

(January 2018)

College/School: College of Education

Program: Curriculum & Learning

Concentration: Early Childhood

Thesis Supervisor

Dr. Holly Seplocha

Copyright © 2018 by *Carmen Espinosa. All rights reserved.*

Abstract

PROMOTING MATHEMATICAL LITERACY IN LATINO CHILDREN THROUGH FAMILY INVOLVEMENT.

by

Carmen Espinosa

Thesis Advisor: Dr. Holly Seplocha

The purpose of this study was to examine the effects of Latino parental involvement on children's mathematical skills development and to increase family participation in and out of school with Take-Home Math Literacy Bags. The participants in the study were 13 preschoolers 3 to 5 years of age from a private urban bilingual child care program in northern New Jersey. The researcher conducted a 4-week bilingual (Spanish/English) family math program for Latino English Language Learner families. Data were collected through the use of pre/post student assessment interviews, family pre/post surveys, family experience surveys, researcher journal and anecdotes, and teacher interview and notes. Data analysis revealed improvement in the participants' counting, shape recognition skills, and increased visits to the math center. Findings also indicated that Latino families enjoyed using the Take-Home Math Literacy Bags and that they helped them support their children's math skills at home.

ACKNOWLEDGEMENTS

Thank you to my children Dilan and Andrea for their encouragement, and support and for inspiring me to live an extraordinary life. Thank you to my hero and my rock, to my beautiful mother, that all of your sacrifices and hard work have paved the way to a generation of new leaders that would make a positive impact in this world. To my brothers Oscar and Cesar and my sister Nena thank you for always being there for me. Thanks to my father that despite his absence he has been an integral figure in my life.

Special thanks to Dr. Holly Seplocha whom I crossed paths a decade ago and inspired me to continue my professional growth. To Dr. Strasser for her guidance and for believing in me.

Finally, my gratitude to my husband Jhon for all the support and patience throughout the whole process. Thank you for understanding how important pursuing a higher education degree was for me.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

Introduction

Overview

According to America's Hispanic Children: Gaining Ground Looking Forward (Murphey, Guzman, & Torres, 2014), of the 74 million children in the United States, 17.5 million are Hispanic. Today, one US child in four is Hispanic. They are the largest racial/ethnic minority group of children and the fastest-growing. Hispanic children represent a significant portion of tomorrow's workforce and taxpayers. Latino children, especially those born outside of the US and English language learners, face some stark challenges that, from an early age, place them at a disadvantage, relative to many other children in the US. Unfortunately, many families may encounter barriers to engagement in schools due to socio-economic pressures, speaking the language, or negative experiences with the education system. Many schools have been less effective in developing strategies to get Latino families more involved in school activities, have no interest, or lack the appropriate knowledge to engage Latino families, especially when they do not speak the dominant language or are recent immigrants (Best & Dunlap, 2012). I believe this is true of early childhood education programs as well. With good intentions, early childhood professionals stress the importance of learning English without a clear understanding of the importance of valuing the contribution bilingual children bring into classrooms.

A focus on Science, Technology, Engineering, and Mathematics (hereinafter referred as to STEM) skills are necessary now more than ever in order to compete in a global economy. The US Department of Education (2012) reported that Hispanic students are currently the largest minority group in the public-school system, but they score lower

than national averages in math and science achievement test and enroll at significantly lower levels. According to the US Congress Joint Economic Committee (JEC), between 2010 and 2020 the overall employment in STEM occupations will increase by 17%, yet not enough students are pursuing careers and degrees in the STEM fields to meet the increasing demand. The lack of STEM representation is even more prevalent among Hispanics, who although accounted for 16% of the US population in 2010, only earned 8% of all certificates and degrees awarded in the STEM fields between 2009 and 2010 (US Department of Education, 2012).

Another issue that might contribute to low achievement in mathematics and literacy might be that Latino families are less enthusiastic about non-parental forms of child care and prefer having a relative or a friend care for their child. I often hear from families in my community that they wait for their children to develop language or turn three years old for them to enroll their children in a preschool program. Latino families that enroll their children in early childhood programs may face many challenges, among them the lack of cultural support from teachers, administrators and policy makers preventing or discouraging them from actively participating in school activities (Kocyigit, 2014). This home-school disconnect may be due to a lack of resources, time and lack of cultural understanding about family dynamics among the diverse group of Latino children that enter childcare and preschool programs.

Understanding and developing mathematical skills in young children is an important step for academic success and the future of our country. As Latinos represent a large minority entering our programs, early childhood educators must emphasize the importance of developing strategies to provide these skills at the preschool level and

encourage family involvement in and out of the classroom. Working closely with families and developing developmentally appropriate curricula and culturally sensible strategies may improve outcomes for children, families and our communities and may contribute to closing the achievement gap among Latinos.

Parents' math anxieties and their limited beliefs about mathematics mastery may prove to be a significant influence on children's math attitudes. I recall telling my children, *"I will help you with any academic subject, but do not ask me to help you with math*". This limited mathematical knowledge and the frustration I have encountered on many occasions as a child and as an adult has made me step up my efforts in providing the children and the families in my program with resources, training, and engagement to pass on the benefits of learning and loving math at an early age. This, in turn, will help families make better financial decisions, live better lives and to become innovative thinkers.

According to the joint position statement provided by NCTM and NAEYC (2002), 3- to 6-year-old children need to be provided high-quality, challenging, and accessible mathematics education since children's math related experiences during early years influence their later performance in school as well as their life outside of school.

Young children are capable of learning mathematics at a very young age, and it is important that educators create environments that promote mathematical understanding and develop partnerships with families to enhance mathematical skills at a young age. Because parents are children's first teachers is essential that families are confident in helping children develop mathematical skills and develop a positive attitude towards math.

Statement of the Problem

As the demographic share of Latinos/as in the United States increases, so too do their economic, social, and political relevance (Mather & Kent, 2009). Latinos/as comprise 16% of the overall population in the United States and approximately 22% of the school population-aged population, with the percentage of school-aged children who are Latino/a predicted to reach 30% by 2030 (US Census Bureau, 2012). Despite these findings, over 75% of early childhood teachers are white and monolingual speakers of mainstream American English (EIS, 2008; Aud, Fox, & Kewal Ramani, 2010). Some of these teachers many not fully understand how to build on the strengths of children whose cultural and linguistic practices are (to varying degrees) different from their own. If we are to inspire children to love and develop mathematical skills, we need teachers that are confident in their math knowledge and transmit this confidence to children.

Latinos' mathematics performance and individual trajectories are partly influenced by their literacy and math exposure and development before they entered the first grade (Lopez, Gallimore, Garnier, & Reese, 2007). The information provided in the study suggested that a significant proportion of Latino children are being placed at risk for mathematics failure before they enter elementary school. These early experiences may lead to devastating outcomes later in their academic careers. Hispanic children start school less likely than their white peers to know their alphabet or numbers. High rates of poverty may be among the factors that influence these disparities, as well as Hispanic children's lower participation in preschool programs. There have been substantial gains in Hispanic's students' performance on national assessments of math, reading, science, and writing over the last decade, though they are still a minority (Murphy, Guzman, & Torres, 2014)

Family resources and involvement in the education of their children may be a necessary strategy to support early mathematics performance. Latino parents may need more support and training on how to actively participate in their children's education at home and school. Epstein et al. (2002) stressed that educators need to develop more comprehensive programs that cover the school, families, and society. Latinos may have a more cohesive family structure in which family members contribute to the caring and education of young children.

Hispanic children are more likely than children in other racial/ethnic groups to eat dinner with their families six or seven nights a week (Murphy et al., 2014). Education levels are lowest for Latinos among other groups. In 2013, 22 % of Latino adults (25 years and over) had earned an associate degree or higher compared to Asians (60 %), Whites (46 %), and African Americans (31 %). (US Census Bureau, 2013). It is important to distinguish these features of Latino Families when developing education strategies to encourage parental involvement in school activities and extending learning at home.

I can recall as a child wanting to bring a book from school home to read, but having access to them was non-existent. My mother had to work long hours, earned a minimum wage to provide for four children and my father had only elementary education and struggled with his parenting skills. Latino families from low-income backgrounds have low-paying jobs that make it hard to provide for their children, have limited resources, limited purchasing power and are significantly underrepresented. There is also a cultural dissonance in many public and private institutions which have failed to developed effective strategies to close the achievement gap among Latinos (Lilles, 2011).

As a parent, this was my experience during my children's attendance in public schools. It has been my experience in my professional career where in many instances these comments are made by a member of our profession that fail to understand the many benefits of developing strategies to improve Latino students' outcomes that will affect us all in the end. My insecurities about my mathematical skills and my early childhood experiences as part of this disadvantaged group of Latinos has made me evaluate my position as an early childhood professional to act in researching and implementing strategies that address these issues of the population I represent.

Wessels and Trainin (2014) stated that Latino families are less likely to read books and share stories with their children than families of other ethnic backgrounds. Immigrant families may lack confidence when reading in English with their children due to limited literacy skills, low English proficiency, lack of shared book-reading experiences, or simply because these activities are viewed as solely the role of the teachers. Early literacy development could be an additional contributor to the Latino math gap (Shaw, Nelsen, & Shen, 2001). The first place where children reveal their inherent potential and develop behaviors is at home. Another factor to keep in mind is the level of education and the confidence of teachers' mathematical proficiency and their ability to support the development of critical mathematical skills in young children.

School engagement among Hispanic families is another area where practices diverge from norms of the majority culture. Part of the problem and, therefore, part of the response seems to be a mismatch, in some cases between the cultural scripts of Hispanic families and those of schools, which may not have caught up with our communities' new diversity (Murphey et al., 2014). In addition, teachers' and parents'

own math anxieties may contribute to this devastating gap among our Latino population. I believe in the best interest of children that educators, policymakers, and community leaders need to work together to empower Latino families to be more proactive in their children's education to close the achievement gap, and raise innovators, geniuses and perhaps increase the representation of Latinos in the STEM. Children are curious and their natural instinct to explore needs to be supported by exposing them to well-planned experiences in math, science, engineering, and technology at a very young age.

Purpose of the Study

This study aimed to examine the effects of parental involvement on children's math skills and to increase family participation in and out of school. In addition, the purpose of this study was to provide parents with support, training, and resources to view participation in and out of school activities as an important step in meeting children's educational needs, particularly in mastering and understanding mathematics and literacy skills, for future academic success. This study involved a four-week bilingual (Spanish/English) family math program for Latino English Language Learner families. This bilingual program was designed for Spanish-speaking parents who did not speak English and bilingual families who wished to engage in read-aloud activities that promoted mathematical thinking in their young children.

The Research Questions

1. How do take-home math literacy bags impact ELL preschoolers' counting skills and shape recognition?
2. How do take-home math literacy bags impact ELL preschoolers' interest and involvement with math materials in the classroom?

3. What effect do take-home math literacy bags have on Latino families supporting their children's math skills at home?

Definition of Variables

English Language Learners (ELLs)

In this study, ELLs refers to preschool children whose primary language is not English. The majority of families in this study spoke Spanish as their first language.

Take-home math literacy bags

For the purpose of this study, a take-home math literacy bag consisted of a kit that included a math-related picture book with researcher-designed math activities for families to work on at home with their child and a family experience survey to be completed by families.

Math skills

In this study, math skills referred to children's ability to count and recognize shapes.

Family Involvement

In this study, family involvement pertained to increased opportunities for families to engage with their children in academic activities at home through a math literacy program.

Children's interest and involvement in math activities in the classroom.

For the purpose of this study, interest and involvement referred to children's free choice to play in the math center or with math materials in other centers in the classroom during free play time.

Hypotheses

It was expected that family involvement in their children's education at home and school would increase academic success in mathematics for their young children. Family involvement is consistently recognized as an important factor in cultivating academic success for young children and is associated with greater achievement in mathematics and reading, as well as higher grades. Also, it was anticipated that families would feel more confident having resources provided to them in their native language and with clear and specific instruction to do at home with their children. When families establish strong relationships with program teachers and administrators and the relationship are one of respect, and collaboration among all parties involved, this may reap great benefits socially and economically for our communities.

Hypothesis I

It was hypothesized that the use of Take-Home Math Literacy Bags would increase preschoolers' math skills in counting, shape recognition, and use of mathematical vocabulary.

Hypothesis II

It was hypothesized that the use of Take-Home Math Literacy Bags would increase children's engagement with math materials and with math-related activities in several learning areas in the classroom and more visits to the math center.

Hypothesis III

It was hypothesized that family involvement in supporting children's math skills would empower Latino parents to take an active role in their children's math and literacy development.

Additional Research Questions

In addition to the formal hypothesis of this study, the teacher-researcher was also interested in some related questions and observations.

What effect does attendance at a family workshop have on preschoolers' literacy math skills development? Do children whose family member attended the workshop have greater increases than those whose families only used the take-home bags without attending the workshop?

CHAPTER II

Review of the Literature

Latinos are the largest racial/ethnic minority group of children, and also the fastest growing in the US (Child Trends, 2014, p. 4). Latinos are underachieving in math skills and are coming to schools unprepared with devastating outcomes for society (Lopez et al. (2007). Latinos are a very diverse group, and it is important to develop strategies in our programs to educate them on how to get more involved in and out of school activities and how to promote learning at home. This literature review focuses on Latino family involvement, Latino children and math dual language learners (DLL), family education and involvement with math, and mathematical development in the early years.

Latino Family Involvement

The debate about parental involvement has been a long and continuous one. Recently, the debate has included the need to find ways to include parents whose first language is not English (Lakshmi Subramaniam, 2010). However, the 2010 reauthorization of the Elementary and Secondary Education Act of 1965 created urgency to the states by committing the states to adopt and set high standards of achievement for all students including students with disabilities, students of poverty, those from minority families, and immigrant students.

A qualitative case study using ethnographic design was set in a large urban school district in Georgia. The researcher attempted to understand some of the perspectives of the parents of this group as it pertained to parent involvement and to identify barriers and facilitators that exist early in the process of parent involvement. The researcher's interest

lay in the area of parent involvement, its barriers, its facilitators, and its impact. Lakshmi Subramaniam (2011) conducted this study through interviews, observations, and focus group meetings. He sought to gather the perspectives of Latino parents of elementary school children who attended a school in the district with an English Speakers of other Languages (ESOL) program, or schools with a large number of Latino students.

The numbers of participants were small; only 11 participants were selected for interviews for this study. Additionally, the focus group meetings involved these interview participants and additional volunteers. This limited the generalizability of the study. Academic impact of parent involvement was forefront in the Latino families involved in the research. However, the difference was in the way the families chose to get involved in their children's education. Families revealed isolation fear, lack of systems to support their involvement in schools with language barriers being the number one limitation preventing them to participate actively. Participants in the study agreed unanimously that their involvement yielded success for their children in academics and their future careers.

Family involvement has been found to be a beneficial factor in young children's learning, calling for the promotion of effective partnerships between homes and schools. O'Donnel and Kirkner (2014) conducted a study on the impact of well-designed family involvement programs and improved outcomes for children especially new Latino immigrants or monolingual Spanish-speakers, to increase their participation in their children's education. This two-year study examined the impact of the YMCA Family Involvement Project (FIP) on levels of family involvement and children's educational performance using a sample of 144 low-income, urban, predominantly monolingual

Spanish-speaking, and Latino caregivers of 208 elementary-aged children primarily composed of mothers.

The researchers (O'Donnel & Kirkner, 2014) collected data by asking parents to complete a registration form, sign a research consent form, and take a pre-assessment survey on family involvement and their children's education on the first day of attendance at any family involvement project. Those families that attended more than one training in home-education or family literacy were asked to complete a survey each time. Attendance sheets and report cards were also collected.

O'Donnel and Kirkner (2014) found significant improvement in the frequency and quality of family-teacher interaction. The study also found that Latinos may be less culturally inclined to contact teachers, given their belief or perception that their children's education is the job of the schools and teachers. These are important findings because the family-school connection has been linked to better educational outcomes for students. Latino families preferred to engage more in-home school activities rather than school-based. The study also concluded that more frequent participation in the family involvement program was significantly and positively predictive of social skills and work habits at the end of the one and two years. The authors noted that participation in the family program helped Latino families and schools reach their educational goals.

Nievar, Jacobson, Chen, Johnson, and Dier (2011) investigated the impact of Home Instruction for Parents of Preschool Youngsters (HIPPY), a paraprofessional home visiting program, on parents and children. The study contrasted parental self-efficacy beliefs and the home environment of Latinas participating in HIPPY with parental beliefs and the environments of Latina mothers of children on the waiting list. The study was

conducted on a program that served low-income Spanish-speaking families. Two different cohorts were studied. The first cohort were families participating in the HIPPY program and the second cohort group consisted of 131 former HIPPY program participants in the third grade and a comparison group of 131 third-graders with similar demographics who were put on a waiting list. The average age of the children was three years and 11 months, and 54 % of the children were three-years-old, and 45% of the children were four-years-old. All of the participants were of Latino origin and were able to read and write in Spanish or English.

The program (Nievar et al., 2014) ran for 30 consecutive weeks during the school year. Families were recruited through word of mouth or through a sign-up form mothers who attended an elementary school pre-kindergarten parent meeting in the spring. Mothers of the program received a packet each week containing developmentally appropriate games and activities that taught science, mathematics, language and communications, motor skills, literacy skills, and social competence. Parents were instructed do work with their child for 20 minutes each day, using the curriculum as their guide. Parents also received nine storybooks each school year to encourage literacy development. Bilingual home visitors role played during the week and conducted home visits to teach parents how to engage their children in these activities. Participants were compensated with $20 for their time and effort. Home observations for measuring the home environment and demographic surveys were collected. Parenting Stress Index surveys in Spanish were administered to all of the participants. The third-grade follow-up supported previous research suggesting that participation in HIPPY has positive effects on later academic achievement. Given the importance of early math experiences, the

HIPPY program aimed at advancing emergent mathematical reasoning in preschool. The result was a sustained achievement through the third grade where students scored higher than the waiting list comparison group, but there was no significant difference due to disparities in English fluency between the participants noted the research results (Nievar et al., 2014).

Preliminary analysis of data from the first cohort showed that parenting stress was associated with less parenting efficacy and higher levels of depressive symptoms. Follow-up analysis revealed that families that participated in the HIPPY program had more positive scores than the control group on the Parental Involvement and Efficacy measure. Findings from this study (Nievar et al., 2014) indicated that HIPPY had a positive effect on the home environment of preschoolers from Spanish-speaking homes as well as the math achievement of these children in third grade. The authors noted that despite the positive outcomes of the intervention program the study was limited to a particular location and point in time, and the observations were limited to 30 minutes as opposed to the standard 45 minutes used by The National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICH SECCYD). The study (Nievar et al., 2014) lacked complete data on whether HIPPY student may have received additional intervention which the control group did not receive.

Anderson, Anderson, and Gear (2015) discussed their research findings on a three-decade work in culturally, linguistically, socially diverse communities in economically depressed rural community in Eastern Canada. This study was conducted in a diverse metropolitan area of western Canada and north-western Canada to document the

development and evolution of a social-contextually responsive family literacy program called *Parents As* Literacy Supporters in Immigrant Communities (PALS). They stated that family literacy programs could build on the strengths that families bring and reflect the social-contextual realities of their communities. The researchers argued that to the date the study was conducted, the study of human development had been based largely on research and theory coming from middle-class communities in Europe and North America.

The researchers (Anderson, Anderson, & Gear, 2015) went on to explained that children use the "cultural tools" (p. 42) including the language of their community and culture inter-psychologically as they are guided and supported by parents and significant other adults in their lives. The article goes on to note how in some cultures parents and caregivers provide less verbal scaffolding than is promoted by many educators in western countries. The participants in the study were 20 families and their 4-year-old children and other adults in the children's lives. Kindergarten and first-grade teachers and an early childhood consultant acted as facilitators, modeling adult-child interactions to support and promote children's learning. Field notes, focus groups, and personal interviews were conducted with parents/caregivers, early childhood educators, and administrators from two community schools. The program conducted 10 to 12, two-and-a-half hour sessions, addressing topics that families wanted to learn more about the subject or issue. Schedules for meetings were flexible reflecting the needs of the community. For the first two years, the researchers met with the families every two months addressing any concerns or issues and making necessary adjustments. They also provided on-going professional development, developed new materials, ordered books

and other resources. Brief demonstrations by the facilitators were provided, and parents were allowed to circulate among the learning centers. Later on, the adults regrouped with the facilitators to discuss the session and reflected on their findings or challenges. An advisory group was apprised of the project through regular meetings, documenting the implementation of the program. Cultural workers translated the materials into four languages. They documented how families enacted their cultural models of learning and teaching in the delivery of their program.

Anderson et al. (2015) found that 20 years after the family literacy program had been implemented, 10 of the 20 families from the original cohort were willing to share their memories and perceptions of the program. They established that families identified integral parts of the program, such as interacting with their children and the learning centers during the parent-child together time, as being very important. They also found that families felt that being able to observe the modeling of adult-child interactions by the facilitators and other parents was crucial and that the modeling and the participation in ongoing dialogue and discussion served to make the child-centered, play-based curriculum and pedagogy in the school setting more transparent. Other families who were just beginning to learn English commented how the bilingual nature of the program allowed them to fully participate more fully as they could access the information and knowledge in their native language while being provided an opportunity to practice English in a safe environment.

Flaws identified in the study (Anderson et al., 2015) showed that despite the success and positive response to the emphasis on maintaining their native language on the part of the adults' participants, there were some indications that some of the children

were already beginning to reject their home languages in favor of English. The researchers did not document the long-term impact of the study calling for longitudinal studies that would follow children as they progress through school and its sustainability.

Latino Children and Math Dual Language Learners (DLL)

A qualitative research study conducted by Wessels (2014) explored the effects of an eight-week bilingual family literacy program for Latino, English learning families. The participants included 17 mothers and 31 children who were enrolled at an elementary school in grades preschool-kindergarten whose first language was Spanish. All family members were invited to participate. Semi-structured interviews were conducted, and parent evaluations, surveys and research field notes were used. The study found that when it came to learning another language, the balance between the two languages was constantly shifting. Parents benefited from the information on the literacy strategies and activities learned throughout the program, and had confidence in their implementation at home, which fostered the development of literacy skills for their children. By the end of the program, parents reported an increase in the amount of time they spent reading and conducting activities with their children.

Latino children, in general, perform below their counterparts in math skills, and this is more evident among female Latino students (Lopez et al., 2007). Many studies have been conducted to identify areas of concern and the development of effective strategies to close the achievement gap.

A review of US studies on the Role of Parents and Teachers in the Development of Gender-Related Math Attitudes (Gunderson, Ramirez, Levine, & Beilock, 2011) revealed that girls tend to have more negative math attitudes, including gender

stereotypes, and self-concepts than boys. Gender stereotypes, anxieties, and self-concepts that adults including parents and teachers have about math attitudes and performance influences the attitudes these young children develop at an early age. The research reviewed existing samples primarily from the US showing that families' and educators' expectancies for children's math competence are often gender-bias. The study focused on early-developing math attitudes as a cluster of beliefs and affective orientations related to mathematics, such as math anxiety, math-gender stereotypes, math self-concepts, and attributions and expectations for success and failure in math. These are major environmental influences on children's development and are particularly important for the formation of academic attitudes.

The review by Gunderson, Ramirez, and Levine (2011) on different research studies focused specifically on parents and teachers, as they represent two major environmental influences on children's development and are particularly important for the formation of academic attitudes. The researchers found that adults' expectancies and attributions are not the only attitudes and behavior that contribute to children's development of math attitudes. Rather, adults own math anxieties including parents and teachers' expectancies and attributions on children's math attitudes and academic achievement. The analysis of the studies showed that the adult's personal attitudes toward math could be thought of as a negative emotional reaction to the prospect of doing math. It is important to note that the article provides a statistical figure describing that 90% of teachers were female. Findings showed that female teachers' math anxiety was related to students' math achievement, but this was only true for female students. In the same way that a female teacher can serve as a role model for the female students, mothers' and

fathers' own attitudes toward math are likely to impact their children's math attitudes, especially since parents are generally a long-term, consistent force in their children's life.

Gunderson et al. (2011) pointed out that despite all of these findings, little research had been conducted on this issue. The reason may be at least partially because of the implicit belief that math learning is primarily the function of schooling, and that parents' role in promoting math learning is not as important as their role in promoting learning in other domains such as reading (Cannon & Ginsburg, 2008). Additional review of the studies found that parent's gender-stereotyped beliefs about their children's abilities influence their children's perceptions of their own math ability. Parents who believe that boys are better at math than girls also apply this stereotype to the abilities of their own children, despite their access to a great deal of information about their child's actual math achievement.

The review of the research (Gunderson et al., 2011) also found that the effects of parents' expectancies on children's math attitudes are less well studied in younger children. Some found that parents' gender biases are present and impact their children in early elementary schools, and those who held stronger math-gender stereotypes were more likely to have gender-biased perceptions of their children's math ability. Another finding in this review showed that US teachers hold gender-stereotyped beliefs about their students' math abilities, perceiving their best male students as being more logical, more competitive, more independent in math, and liking math more than their best female students.

With regards to gender differences, when asked to rate the importance of several factors on their middle-school children's math successes and failures, mothers are more

likely to attribute boy's math success to natural talent and girls' math success to effort. These studies (Gunderson et al., 2012) suggest that believing that boys have greater math ability than girls, parents and teachers also make attributions about children's success and failure in math in ways that privilege boy's math talent over girls influencing the messages they convey about math to their children or students. Another finding indicated that preschool and early elementary school children have shown that math attitudes are already gender-differentiated at this age. Young children are influenced even by subtle introductions of math-gender stereotypes, and by endorsing these beliefs, their math performance can be affected causing students to perform below their actual ability level. Drawing upon the above research analysis (Gunderson et al., 2012), the researchers proposed a deeper consideration of the developmental perspective and behavioral mechanism that accompany adult's attitudes and impact children's attitudes and mathematical achievement.

Educators, researchers, and policy makers are increasing their attention to the quality of early childhood mathematics education in light of growing concerns about young children's early mathematics knowledge. American children's performance on mathematics assessments is lower than that of children from a number of other developed countries (Presser, Clements, Ginsburg, & Ertle, 2015). The researchers evaluated the Big Math for Little Kids (BMLK), a pre-kindergarten and kindergarten curriculum developed with funding from the National Science Foundation. The purpose was to investigate whether the BMLK curriculum's produced gains in achievement above and beyond the mathematics instruction that typically occurs in preschool and kindergarten for low-SES

children, as measured by a nationally standardized mathematics outcome measure that was not aligned with the curriculum.

Participants in the study (Presser, Clements, Ginsburg, & Ertle, 2015) were 762 children and their teachers in 16 publicly subsidized child care centers. Most children in the study came from small single-parent, low-income families. Close to one-quarter of the child sample spoke Spanish at home, and 50.7 % of the children were female. Of the 16 recruited child care centers 50% were randomly assigned to the BMLK group and the other 50% of the comparison group that used the Creative Curriculum or BAU control group. A total of 28 teachers participating in the research taught during the prekindergarten year and 16 teachers taught during the kindergarten year, and four taught during both years.

A longitudinal cluster-randomized controlled trial took place over two academic years (19 months) when children were in prekindergarten (during Year 1 of the study) and kindergarten (during Year 2). The researchers (Presser et al., 2015) also conducted two additional exploratory analyses. In the first analyses, the researchers compared standardized scores for children in the study to available national norms to understand how the sample began and ended each year in comparison to the national sample. In the second study, the researchers piloted a mathematical language measure. A secondary research question was also investigated to learn if children that were exposed to the Big Math for Little Kids curriculum developed a greater ability to use and understand mathematical language compared to children who participate in their preschools' typical mathematical instruction. The intervention group teachers received the curriculum and targeted professional development on the use of the BMLK curriculum during the year of

participation. The comparison group of teachers received the standard professional development offered during the study. A mathematics knowledge assessment was designed and used to survey children's mathematical knowledge and skills and was administered by trained assessors hired to conduct such assessments. A mathematics language measure was used at the last round of testing at the end of kindergarten to provide evidence of a possible change in mathematical language ability. A fidelity of implementation observation measure was created by the researchers that included ratings for critical areas of implementation, specifically: content coverage, quality of teacher directions, student engagement, materials, vocabulary and a global rating of adherence to the intent of the activity. To collect demographic data a child-level covariate was used. The covariates included in the analyses were the child's age at the beginning of the prekindergarten year, gender, family income, and a dichotomously coded variable indicating whether the child was Black/non- Hispanic or Hispanic.

The results of the study (Presser et al., 2015) showed that the BMLK curriculum produced a gain in achievement above and beyond of the comparison to the controlled group. ECELS-B scored at a faster rate than in the control group. The use of the BMLK also helped children improved their ability to use mathematical language and promoted effective use of descriptive and analytical mathematical language. However, the study did not indicate how the curriculum impacted student understanding of key mathematical concepts. The researchers acknowledged that their findings should be viewed as preliminary evidence that can be used to fuel future research rather than providing conclusive evidence of the effect of the curriculum on children's mathematical language.

The researchers (Presser et al., 2015) noted some limitations to their study. The first limitation was the recruitment of subsidized child care centers serving children from predominantly single-parent families living at or below the federal poverty level, not including classrooms that serve middle or high-SES children. The study took place in publicly subsidized child care centers that included prekindergarten and kindergarten classrooms, which was not a common structure for child care centers at the time. The third limitation was the expectation that children would have a different teacher when they moved to kindergarten. During the study four preschool teachers moved to kindergarten with the preschool children. It was not clear if the children may have benefited from having the same teacher for two years. The final limitation was that children's standardized scores did not emerge until the children were in kindergarten raising the question of the effectiveness of the curriculum in kindergarten than for prekindergarten.

Family Education Involvement with Math

Kyle, McIntyre, and Moore (2001) conducted a study on how to improve classroom instruction by connecting with their students and their families to support mathematics achievement. Their main focus (as cited by Moll & Gonzalez, 1996) was on understanding the "funds of knowledge" of the children and their families, then developing instruction that connected with previously acquired knowledge. The participants were multi-age primary school classrooms of six-to-eight-year-olds. The researchers conducted home visits, scheduled interviews, and held informal conversations with families.

Kyle et al. (2001) found that their mathematics family night project among others was successful in helping parents see the mathematics that they already had at home and practiced it to enhance their children's learning at school. Children also accomplished high-level problem-solving skills because the problems presented were linked to their real-life experiences. Although they were happy with the results of family involvement at home, the researchers recognized that math teaching was not happening in the classroom as often as they wished. They also stated that it was a challenge in connecting mathematics with family life all the time.

The purpose of Rodriguez (2016) research study was to examine the relationship between parental involvement of seventh-grade middle school Latino students and students' reading and mathematics achievement. This study was conducted in Miami-Dade County in Florida where Latinos make up 65% of the population. The study also examined selected relevant demographic variables, including socioeconomic status, parents' level of education, single versus two-parent families, and the gender of the students and parents.

Rodriguez (2016) implemented a non-experimental correlational research study to obtain a better understanding of the types and intensity of Latino immigrant parental involvement and the relationship to their children's reading and math grades in middle school. The participants in the study included 134 Latino immigrant parents from different Latin countries. Parent survey questionnaires were utilized to collect information on the demographics of the parents and their degree of parental involvement. Correlational and multiple regression analyses were used to test the research questions and examine the hypotheses.

The study (Rodriguez, 2016) revealed that there was a statistically significant relationship between the reading and parental SES variables. The results of the multiple regression analyses did not find a significant association between parental involvement and their children's reading and math first-quarter grades. The research also found that parents' socioeconomic status was positively related to mathematics achievement, as measured by the quarter report card grades.

Family Involvement

Kocyigit (2014) examined the views of teachers, administrators, and parents about the problems that emerge during family involvement in preschool activities and solutions to these problems. The participants were 10 teachers, 10 parents and 10 administrators from two preschools and three kindergartens in the Palandöken and Yakutiye districts of Erzurum. Of the administrators chosen, four were female, and six were male. One administrator had 1-5 years of professional experience, three had 6-10 years, another three had 11-15 years, one had 16-20 years, and the remaining two had over 20 years of experience. The participants were selected by using the purposive method of typical sampling aiming to obtain deep information by using the special knowledge or expertise of people in the sample. Data were collected via semi-structured interviews and analyzed using descriptive and content analysis.

The results of the study (Kocyigit, 2014) showed that teachers and administrators and teachers organized various family involvement activities within the context of family educational activities and parents participated in on or more of them. Family involvement activities were found to be affected by factors such as time, cost, interaction, order,

sharing getting familiar with each other, ease of transportation, updated notice boards, technology, school facilities, security, control, requirements and participation size.

Kocyigit (2014) found that teachers first consideration on planning activities for family involvement was time and cost and they preferred educational meetings and conferences, while administrators mentioned interaction as another important factor other than time and cost. Parents listed order, sharing and getting to know other parents as their reasons for participating in meetings and sharing and order as their reason for participating in conferences. Teachers and administrator preferred personal meetings for family education owing to private sharing and effective communication, while parents mentioned private sharing as their reason. The research revealed that teachers, administrators, and parents mostly preferred verbal communication in family communication activities. The study concluded that parents often prefer to meet teachers face-to-face or use correspondence when it comes in worksheets and daily information notes.

Decades of research have consistently demonstrated that family engagement in a child's education is strongly associated with positive outcomes according to Best and Dunlap's (2012) research article. As stated in their article, data demonstrated that this is true even across cultures and countries regardless of socioeconomic circumstances, children will see greater academic success if they have adults at home who are engaged in their education.

The article also pointed out that despite the positive outcomes associated with family involvement, many schools and districts still struggle to cultivate meaningful relationships with the community members. Other barriers such as the loss of federal

funding for Parental Information and Resources Centers intensified the need for states and districts to evaluate their policies related to family involvement in education. Some families don't have the time or resources to devote to high levels of engagement particularly when faced with economic pressures such as the need to work multiple jobs. Unwelcoming school environments, lack of cultural sensitivity and differences in interpersonal communication styles were also noted. Home-related barriers included difficulties with scheduling, transportation, childcare, and finances.

Regardless of families' socioeconomic status, parents are interested in their children's academic success (Best & Dunlap, 2012). Schools that fostered productive relationships with all stakeholders placed a strong emphasis on understanding and addressing class and cultural differences. The researchers made recommendations on improving family engagement. Schools faced unique challenges and opportunities as a result of their context, and those challenges affected the way they developed their policies and relationships with multiple stakeholders.

Hindman and Morrison (2012) investigated parenting practices among families of preschoolers in a middle-income community, as well as the contributions of these practices to children's literacy and learning-related social skills. The participants in the study, a total of 229 children and their families, were recruited into the Pathways to Literacy Project, with a median age of the children of 4.37. About half of preschoolers were between the ages of 4 and 5 years of age in a prekindergarten bound program preparing for kindergarten, and the remaining half of the sample were completing their first year of preschool. Girls comprised 50% of participants. White children represented 80% of the sample, 10% were African American, 5% were Asian, 3% were Arab

American, and 2% were Hispanic/Latino. Parent background questionnaires, the Parenting Questionnaire (Morrison & Cooney, 2002, as cited in Hindman & Morrison, 2012) was used; in addition, child academic and social skills assessments were conducted with parents completing the social skills rating system.

Hindman and Morrison (2012) found that parenting during the preschool period is composed of multiple, largely independent dimensions capturing both cognitive and affective stimulation and that these facets of parenting demonstrate specific links to child outcomes. The study found that families with higher levels of education predicted a more frequent focus on letters and sounds, book reading, and math and with White families reading books more often than minority families. The home learning environment emerged as a particularly important component of parenting, contributing to code-related literacy skills, as well as cooperation compliance.

Mathematical Development in the Early Years

A growing body of research has shown that humans have a sense of numerical magnitudes, which depends on a cognitive system that emerges in humans by 5 years of age. (Varol & Dale, 2006, p.381). Early Mathematical Growth was a critical analysis conducted by Varol and Dale (2006) to investigate young children's sense of numerical magnitudes and the important attributes of classrooms where children in kindergarten and first grade are exposed to mathematics. The researchers discussed how in the first weeks of their life humans begin developing mathematical understanding and reasoning. Young infants notice the difference between small numbers, and 10-month-olds demonstrated this skill as well. When children turn 2-years-old, they begin to learn to count; however, they do not necessarily understand the cardinal meaning of numbers until 4 or 5 years of

age. Children also developed other mathematical concepts informally through discovery such as shapes and informal measuring systems that help children make comparisons. The researchers noted that classroom resources might improve children's social and behavioral health. They also found that the adequacy of classroom supplies corresponds with parental involvement. An emphasis on the powers of internal characteristics of teachers, including their beliefs, attitudes toward mathematics, attitudes toward students, and his/her knowledge of mathematics, have the power to transform the classroom into a learning environment that advances student's mathematical ability.

Varol and Farran (2006) offered guidelines that would assist teachers as they teach mathematics to children between the ages of 5 and 7. Some of these guidelines included: providing challenging learning environments that don't limit any child's access to challenging mathematics instruction. The study made reference to the beliefs of many seminal voices in the field of early childhood education, including Montessori, Plato, Pestalozzi, Froebel, Owen, and Dewey, about their beliefs that mathematics should be introduced to young children through objects. The classroom discourse is another factor discussed, noting that in student-centered classrooms, one strategy that can be useful in helping students learn mathematics is engaging them with interesting classroom discussions. It was suggested in the analysis, that teachers provide concrete materials and help children connect those materials with effective and developmentally appropriate mathematical tasks. The final factor noted in the research was the quality assessments that enables teachers to obtain information about student's skills and potential, to improve instruction, and to provide feedback to students. The article reviewed concluded that in order to support young children's mathematical development it is the teacher's

role to create a safe learning environments, to provide effective classroom discourse, to plan worthy task for students, and to assess student's thinking to promote a high degree of mathematical competency for young children.

Dobbs and Robinson (2012) investigated the association between children's mathematical skills and their behavior in the prekindergarten year in a national sample of children attending center-based child care. The goal of this longitudinal study was to document the relationships between preschool children's social-emotional behaviors and approaches to learning (e.g., attention and persistence) and their mathematics achievement. The participants in the study consisted of 5,400 children in center-based childcare, had older mothers and were less likely to be minorities, 51.7% were male with a mean age of 53 months. Children spent an average of 26 hours per week in child care, and 22% of participants were children attending a Head Start program. Interviews were conducted across five regions with one regional supervisor, five to six field supervisors and 16 to 18 field interviewers. Children's cognitive and math skills were directly assessed during home visits. Early care and education providers of each participating child completed behavioral ratings describing the child's behavior in the child care setting. The results showed that behavioral profiles of young children are related to their mathematical achievement in important ways. Approaches to learning showed a strong relationship to mathematics, whereas prosocial behaviors, internalizing behaviors (e.g., aggression and anger) and externalizing behavior's (e.g., sharing with and comforting others), relationships with mathematical skills disappear after accounting for approaches to learning.

The researchers (Dobbs & Robinson, 2012) noted that their study had limitations, and no causal conclusions could be drawn with regards to the relationship between approaches to learning behaviors and mathematics. This was a correlational study where the relationships described in the research were associative. Dobbs and Robinson suggested that it may be that children's behavioral orientations affect their mathematical skills, perhaps by influencing the learning opportunities available to each child. They also noted that perhaps children who are experiencing success in their learning and reinforcement from their teachers are more likely to behave in desired ways. They suggested that future research could address these limitations through experimental approaches.

There is a national need for effective interventions to improve school readiness and subsequent achievement in mathematics for students from low-income families (Starkey, Klein, & DeFlorio, 2013). The purpose of the study conducted by Starkey et al. was to implement and evaluate the efficacy of a math curriculum and compare the impact of the intervention the first and second year of the math curriculum. The two-year preschool math intervention began at preschool entry when children were 3 years of age and continued through the end of the pre-kindergarten year. The participants in the study included 526 preschool children (274 females and 252 males). The ethnic composition was 58% Latino, 18% African American, 14% Caucasian, 5% Asian/Pacific Islander, and 5% multi-ethnic/other. The mean age of the sample was 3.38 of age.

Activities in Pre-Pre-K Mathematics and Pre-K mathematics were implemented with concrete manipulatives and employed rich mathematical language (Starkey & Klein, 2013). Children remained in the same classrooms with the same teachers throughout their

two years of preschool. Children engaged in activities in small groups, with teachers scaffolding activities as needed. Teachers received a math curriculum book, materials and professional development that included intensive workshops with facilitators providing technical assistance and corrective feedback. A child math assessment and the Test of Early Mathematics Ability (TEMA-3) were some of the measures used to collect outcome data for all children participating in the study. Data on classroom mediators and moderators were also collected.

Starkey and Klein (2013) found that greater gains in math knowledge experienced by 3-year-old treatment children in the pre-pre-k year than by the 3-year-olds who did not receive this intervention. Gains sustained during the 1st year intervention began to fade in Kindergarten. Gains in the 2nd year of intervention were sustained in Kindergarten. The same was true for the 4-year-olds in the research study. The effect of the math curriculum in year 1 vs. year 2 in the fall was higher but not significantly different in spring. Possible explanations are better retention after two years of intervention or greater consolidation of previously learned informal math knowledge.

Summary of the Literature Review

The literature review presented important findings and considerations in my research study that was considered in the investigation of Latino parental involvement with math literacy bags at home.

Lakshmi Subramaniam (2010) made reference to the debate about parental involvement and the need to find new ways to include parents whose first language is not English. The researcher noted in his study that Latino families chose different ways to get involved in their children's education. The study also revealed isolation, fear, lack of

systems to support their involvement in schools with language barriers being the number one limitation preventing them to participate actively. However, participants in his study agreed unanimously that their involvement yield success for their children in academics and their future careers.

Similar results were found in the study conducted by O'Donnell and Kirkner (2014). The researchers found that better family-teacher relationships had been linked to higher student reading engagement and achievement in early elementary school. The researchers noted that Latinos might be less culturally inclined to contact teachers, given the high regard they may have for school staff or the perception that education is the business of schools. They found that Latinos families engaged in substantially more in-home (rather than school-based) involvement activities, both before and after participation in the YMCA family involvement program research study. The researchers found a significant increase in their school-based involvement after the intervention. Latino Families became more comfortable interacting with teachers and administrators and became more confident in their skills to help their children.

These two studies have a common result that indicated that when Latino parental involvement programs are designed to create interventions that are culturally relevant, the outcomes for this minority group are beneficial and closes the achievement gap among Latinos.

Adult's math anxieties and negative attitudes toward math could be thought of as a negative emotional reaction to the prospect of doing math (Gunderson et al., 2011). Studies have found that Latino's low mathematics achievement is a pressing issue given that the Latino population is the fastest growing minority group in the United States.

Latino children are coming to schools unprepared with devastating outcomes for society, Lopez et al., (2007). Latinos face many challenges such as cultural deprivation, inferiority, lack of math preparation by their teachers and low levels of parental participation in school activities among others.

The Latino math gap can be described as a pipeline crisis resulting in an overwhelming disparity in mathematics achievement between Latinos and their majority group peers (Wirt et al., 2005). Latinos math achievement continues to lag behind that of students of other races. Mathematics education is a critical component for the future success of the Latino population in the United States. As the academic demands in mathematics become greater as children enter kindergarten and primary levels, is important to develop strategies to engage families in the education of their children.

Family engagement in a child's education is strongly associated with positive student outcomes (Best & Dunlap, 2012). Despite these positive outcomes, many school districts serving Latino children struggle to cultivate meaningful, responsive and culturally sensitive approaches to involve and welcome Latino family involvement in and out of schools. Latino families value education and are committed to their children's academic success.

The findings in the literature review indicated that parental involvement may yield great benefits for closing the achievement gap among Latinos as O'Donnel and Kirkner (2014) found in their research. Well-designed programs and the promotion of effective partnerships to close the Latino gap is an investment that may help to improve Latino students' math achievement and increase their engagement in STEM education.

CHAPTER III

Methods

Participants

The participants of this study were selected from a child development center located in Northern, New Jersey. The sample consisted of 17 preschoolers 3 to 5 years old. Classroom 1 was composed of three girls and five boys 3 to 4 years of age. Classroom 2 was composed of four girls and five boys aged 4 to 5 years old. The ethnic makeup of the participants were 15 children from different Latino countries, one was Lebanese, and one was African American. All children came from a two-parent household.

The researcher was the owner-director of the child development center and a Latino female in her 17th year of administering this bilingual program in a low-income urban neighborhood in northern New Jersey. The researcher held a Preschool to Grade 3 teacher certification obtained via an alternate route program at a university in New Jersey. The researcher was fluent in English and Spanish. The two classroom teacher participants in the study were both Latino females who were fluent in English and Spanish. Teacher 1 had 16 years of experience working with children, possessed a BS in Liberal Arts and a Bilingual Child Development Associate (CDA) certificate. Teacher 2 was attending a 2-year college majoring in Early Childhood Education and had two years of experience working with preschoolers.

Materials

The Family Math Literacy Take-Home Bags

The Family Math Literacy Take-Home Bags (Appendix A) were assembled by the researcher; they consisted of a bag with a math-related storybook, an activity card, a

vocabulary card with words related to the story designed to support math, and instructions on how to use the bag. This math literacy bag was introduced at a workshop for families. Also in each bag was a family experience survey for family member participants to document their experience and make suggestions or comments about the program for the duration of the program. A literacy bag checklist was also included. There were 17 take-home math literacy bags composed of four sets of bags with each set containing copies of the same storybook. The remaining bag was also a duplicate of one of the bags. The math literacy bags contained English storybooks with translations in Spanish used in the research study.

Take-Home Math Literacy Bag Instructions

Written instructions (Appendix B) on how to use the take-home math literacy bag were included in English and Spanish. The instructions specified when and how long families were to keep the bags, conduct activities with their children and fill out a family experience survey.

Take-home Math Literacy Bag Materials

Materials for the four take-home literacy bags (Appendix C) also included:

Family Experience Survey

The families were given a Family Experience Survey (Appendix D) developed by the researcher with the take-home math literacy bag. The family experience survey was designed to see how families used the Take-Home Math Literacy Bags. It also gave the researcher insight whether the families were using the Take-Home Math Literacy Bag using the strategies provided to them during the workshop. The Family Experience Survey consisted of five open-ended questions in English and Spanish.

Classroom Camera

A photographic camera was available to document math-related activities in children's play if needed. This camera was an optional data collection tool that would replace anecdotal notes documented by the teachers.

Math Materials in the Classroom

The different learning centers were equipped with materials that encouraged children to explore multiple concepts in each component of mathematics. Math related books, open-ended materials and collectibles such as buttons and keys, symbolic mathematical materials such as dice, dominoes, pegs and pegboards, stringing beans and pattern cards, containers for sorting, blocks, geometric solids, photographs of buildings and shapes were available for children to experience mathematics in similar ways to their mathematical experiences at home in both classrooms. Materials related to the math literacy books sent home were added throughout the different learning centers in both classrooms. Different sets of counters and a bingo shape game were added to the math center as well.

Pre/Post Math Assessment Interview

A pre/post assessment interview (Appendix E and Appendix F) was used by the researcher to identify the mathematical understanding of each child in the classroom before and after the intervention. The pre/post math assessment interview was designed by the researcher based on the NJ State Department of Education Preschool Teaching and Learning Standards (New Jersey Department of Education, 2013). The pre/post math assessment interviews were identical to find out the range of mathematical understanding of each child in the two classes before and after the math literacy program intervention.

The math assessment interview was composed of three items assessing numbers, counting and shape recognition. This pre/post math assessment interview was used to test children's understanding of numbers and quantities and to identify and describe shapes. A rubric (Appendix E and Appendix F) were created to assess the children's responses to the assessment interview.

Researcher Journal and Anecdotes

A researcher journal (Appendix G) was kept to record comments made by families, teachers, and children as well as weekly researcher reflections about the study. Anecdotes were also written by the researcher documenting casual observations of children's play and conversations using mathematical concepts or vocabulary, reflections, and field notes during each visit to the classroom.

Family Workshop

A 1-hour workshop was designed and presented by the researcher, to provide family education and support parents on how to help their children develop mathematical skills at home using the Take-Home Math Literacy Bags. An agenda (Appendix H) was distributed to all participants before the beginning of the workshop.

Family Math Newsletter

A Family Math Newsletter (Appendix I) was written by the researcher and included tips for parents on how to help their children develop mathematical skills at home. This newsletter was distributed to families at the family workshop.

Family Pre- Survey

A family pre-survey (Appendix J) in both languages English-Spanish included five questions each that pertained to the home environment and asked parents to report a number of materials they had in the home and hours children spent with their families

engaged in particular activities in a given week. This pre-survey was distributed prior to the beginning of the workshop.

Post-Survey of Take-home Literacy Bags

The parents who participated in the study were given a post-survey (Appendix K). The post-survey asked questions about the take-home math literacy bags process. There were also questions concerning any problems with the bags or the whole process. The survey also contained a section where the parents were asked to give any suggestions for future uses of the Take-Home Math Literacy Bags. The post-survey was comprised of four open-ended questions that were in English and Spanish.

Researcher Visits to the Classroom

A form (Appendix L) was created by the researcher to document observations during her visits to the classroom. Space was provided to note the classroom, date and time, as well as observational notes and any direct quotes from children.

Workshop Agenda

An agenda (Appendix M) was prepared for the family math workshop. This provided an overview of the activities of the workshop and distributed to families at the workshop in both English and Spanish.

Classroom Teacher Notes

A classroom teacher notes form (Appendix N) was created by the researcher and provided to the teachers in the classroom to document any mathematical conversation or math play observed in any learning center, increased visits to the math learning area and parent's comments related to the math literacy program.

Teacher Interview Guide

A teacher interview guide (Appendix O) was designed by the researcher with four questions to be answered by the teachers at a scheduled 20-minute weekly conference interview with the researcher. This interview was conducted at nap time in the classroom with minimum interruptions to the teacher's schedule.

Procedures

All family members were invited to participate in the math literacy program. The majority of Latino families spoke English and Spanish, and 14 received childcare subsidies. All participants submitted a consent to participate. Students were assessed in mathematical skills and knowledge the week prior to the start of the study. The study was conducted for four weeks towards the end of the school. A parent meeting was scheduled in advance through a family letter that was sent home (Appendix H) to inform the families about the program, explaining the objectives of the math literacy program, logistics of the program and to model adult-child interactions to support and promote children's mathematical learning at home. On delivery of the Ttake-Home Math Literacy Bags, parents were asked to read the written instructions (Appendix B) both in English and Spanish included in the bag, and clarification of the program and procedures was given when requested. The written instructions asked parents to choose times spread over a weekend period to share the materials at home with their child during a 4-week period on a rotating basis. Parents were assured that there was no one way to use the materials and that they had the freedom to use them in a way they felt comfortable with. Families were encouraged to document their experience in the family experience survey

included in the packet. The preschoolers were individually assessed in their classroom using a Mathematics assessment interview format designed by the researcher prior to the intervention and at the conclusion of the intervention (Appendix E and Appendix F)

Pre-Intervention Procedures

Prior to the beginning of the study, a family letter (Appendix H) was sent home announcing the implementation of a take-home math literacy program and a set date for the family workshop. A pre-intervention survey (Appendix J) was handed out inquiring about family engagement in academic activities prior to the beginning of the workshop. The researcher read a math literacy book demonstrating developmentally appropriate techniques and strategies to engage children and encouraged critical thinking during reading aloud with their families that allowed home-school continuity for the children. Families were given the opportunity to ask questions on the workshop. The math literacy bags were distributed to the family participants and families were instructed to return the bags on Tuesday of the following week in order to rotate for a new math literacy bag. Explanations about the content of the bags were given to parents in both languages English and Spanish.

A pre-assessment of children's mathematical skills was conducted by the researcher in the classroom during choice time, one week before the beginning of the math literacy program. The pre-assessment consisted of a 5-10-minute mathematical interview (Appendix E) during which the researcher asked children to solve several mathematical tasks and to explain their thinking as they proceeded. Three different children were assessed every day two weeks before the beginning of the intervention. Children were assessed individually, and they were pulled out during choice time, which

was from 9:15-10:15 am. The researcher would call over one student at a time to the math center area where she would interview the children asking them to count, point or identify a shape or number as much as they could. The assessment was conducted in English, and the answers were written and scored in the assessment rubric (Appendix E).

Prior to the intervention, two weeks before the study was to be conducted, the teachers in both classrooms were instructed to document any mathematical conversation or math play observed in any learning center. Teachers were also instructed to document increased visits to the math learning area and parent's comments related to the math literacy program in the teacher notes (Appendix N) provided by the researcher.

Intervention Procedures

The family workshop (Appendix M) began with the researcher presenting a few facts and findings of the importance of family involvement in and out of school to help children be better prepared academically when entering kindergarten to increase children's mathematical skills and knowledge. The researcher also discussed the value of sustaining this effort throughout their school years. The researcher read a book using the strategies that would be taught in the workshop. The workshop then went over the strategies on how to read books to children. During the workshop, the researcher would pause for questions or comment what was being discussed. The math literacy bags were given at the workshop for family participants. The researcher discussed all the materials in the bag, item by item. A math literacy bag was sent home to families that were unable to attend the workshop at drop off or pick up time. The workshop was conducted in English and Spanish, and it was held late in the afternoon around pick up time. Children that accompanied the parents were supervised by the paraprofessional in the classroom

next door. As families returned a math literacy bag, a different one was sent home for the duration of four weeks' intervention program. The researcher would take the family experience survey (Appendix D) out of the Take-Home Math Literacy Bag every time a bag was returned. The researcher would then replace the bag with a new family experience survey for the following family. Bags were also checked to ensure materials had been returned and were ready to use by another family.

The researcher visited each classroom two times a week for one hour in the morning during choice time which was between 9:15-10:15 am. Classroom 1 was visited by the researcher Mondays and Fridays and Classroom 2 was visited Tuesdays and Thursdays. The researcher met with the teachers at nap time every Friday for 15 minutes for the duration of the intervention to discuss their observations and respond to questions (Appendix O). The researcher then collected the center time notes (Appendix N) or pictures if any or recorded teacher's comments and observations in the researcher journal during the researcher-teacher meeting.

A schedule of visits to the classroom and teacher interviews or discussions was kept throughout the duration of the research study that included times, and number of visits to each of the classrooms (Appendix L).

Post-Intervention Procedures

At the conclusion of the study, all math literacy bags, surveys, and family experience surveys were collected. Families were invited to come back to the center with their completed post-survey (Appendix K) and share their experiences about the program with the researcher and other families. Parents were asked about the familiarity of the

materials, whether the activities they shared were typical of things they normally did with their children at home, and how regularly they shared such activities.

The children were assessed at the end of the study (Appendix F) using a one-on-one post/assessment interview. The week after the conclusion of the take-home math literacy program children were pulled out during choice time, which was from 9:15-10:15 a.m. The researcher would call over one student at a time to the math center area where she would conduct the post/assessment interview with the children asking them to count, point or identify a shape or number and performing a mathematical task and explained their thinking as they proceeded. The assessment was conducted in English; the answers were written and scored in the assessment rubric. The results were documented to see if a gain if any was evident in mathematical skills development and math literacy. The interview assessed the following content standards of mathematics: counting, and geometry.

The teachers' role included documenting any evidence in the center's notes form provided to the teachers (Appendix N) of visits to the math learning center, observations of math play in any center or conversations that included or were math related and reported to the researcher during a teacher-researcher 20-minute weekly conference (Appendix O). Evidence gathered by the teachers was documented in the researcher's journal. The teachers were given the option to supplement anecdotal notes for photographs with the classroom camera of the children during math observations. A schedule of visits to the classroom and teacher interviews was kept throughout the duration of the research study that included times, and number of visits to each of the classrooms (Appendix L).

Data Collection

The data collected in this study were used to explore whether the math literacy program produced any impact on the children's math skills in number and geometry. The data collected were also used to see if parental involvement with the math literacy bags improved children's mathematical language and skills, and evidence of increased interest in mathematics activities in the classroom.

My role as a researcher was that of an objective observer who examined the effects of parental involvement on the children's increased numeracy skills and to increase family participation through a Take-Home Math Literacy program in and out of school. As an objective researcher, I used a host of different research methods to collect data to analyze the results of the study. Assessing the students, reading family's experience surveys, and collecting teacher's observations through center notes, photographs or weekly interviews allowed the researcher "to gain insights into other's perspectives" about the research study as stated by Goodwin and Goodwin (1996, p. 134). Naturalistic observation techniques such as the researcher journal, anecdotes collected by the researcher and teachers were used in this study to collect data and analyze results of the impact of the Math Family Workshop and Math Literacy Take-Home Bags. The pre/post surveys (Appendix J and Appendix K) collected were additional qualitative methods used to collect data in this study. Quantitative methods such as children assessment interviews and qualitative methods such as classroom observations and teacher's weekly discussion meetings with the researcher were used in this study.

Goodwin and Goodwin (1996 p. 163-164)) advocated the use of both qualitative and quantitative methods in a single study as both approaches generate knowledge that

could well appeal to different audiences and the knowledge generated from both qualitative and quantitative methods are quite different, thus creating a significant bond between the approaches. Table 1 displays a calendar schedule of the data collected by the researcher. Table 2 graphically displays and organizes the data collection methods according to Hypothesis 1, 2 and 3.

Table 1

Data Collection Schedule

Data source	Week 1	Week 2	Week 3	Week 4	Week 5
Pre-math assessment interview	*X*				
Center Notes	*X*	*X*	*X*	*X*	
Researcher Journal	*X*	*X*	*X*	*X*	*X*
Family Pre-Survey	*X*				
Family Experience Survey	*X*	*X*	*X*	*X*	
Teacher-Researcher Meeting	*X*	*X*	*X*	*X*	
Children Post-Assessment				*X*	
Family Post-Survey				*X*	

Table 2

Data Collection Methods

Research Questions	1. How do take home math literacy bags impact preschooler's counting skills and shape recognition?	2. How do take-home math literacy bags impact preschooler's interest and involvement with math materials in the classroom?	3. What effect do take-home math literacy bags have on families supporting their children's math skills at home?
Pre/post math assessment interview	X		
Researcher journal and anecdotes	X	X	X
Family experience survey			X
Pre/post parent survey			X
Teacher interview and notes	X	X	

CHAPTER IV

Results

Overview

The purpose of this study was to examine the effects of Latino parental involvement on children's mathematical skills development and to increase family participation in and out of school with The Family Math Literacy Take-Home Bags. This study involved a four-week bilingual (Spanish-English) family math program for Latino English language learner families. The data collected in this study were used to explore whether the math literacy program produced any impact on the children's math skills in counting and shape recognition at home and school. The data collected were also used to measure the effect of Take-Home Math Literacy Bags had on families supporting their children's mathematical language and skills, and evidence of increased interest in mathematics activities in the classroom.

The researcher had originally planned this study to include 17 participants. However, the sample was reduced for varied reasons beyond the researcher's control. One participant traveled outside the country for two months and was expected to return in September, and three other students finished their school year before their post-intervention assessment could be finalized, so data collected for these participants was not counted as part of the research study.

The final sample consisted of 13 preschoolers 3 to 5 years old. Classroom 1 was composed of one girl and four boys 3 years of age. Classroom 2 was composed of four girls and five boys aged 4 to 5 years old. The ethnic makeup of the participants were 11 children from different Latino countries, one was Lebanese, and one was African

American. All children came from a two-parent household. At the conclusion of the study, three boys and one girl had come to the end of their enrollment in the program, leaving the total count of 13 children that completed the intervention

A 1-hour workshop was presented by the researcher, to provide family education and support parents on how to help their children at home using the Take-Home Math Literacy Bags. A family pre/post survey in both languages English-Spanish were given to parents (Appendices J & K) with questions pertaining to the home environment, materials at home, time families spend with their children doing particular activities at home, and questions concerning any problems with the bags or the whole process. These pre/post family surveys were collected at the introductory workshop, and a scheduled meeting after the study and any trends were noted. A pre/post assessment interview (Appendices E & F) was used by the researcher to identify the mathematical understanding of each child in the classroom before and after the intervention.

Family Experience surveys (Appendix D) were sent home to families in each Take-Home Math Literacy Bags for the four-week duration of the study and were collected and analyzed. The responses in the survey gave the researcher insight whether the families were using the Take-Home Math Literacy Bags using the strategies provided to them during the workshop when they read to their children and if the parents enjoyed the activities.

An important question about whether the materials and activities provided in the Take-Home Math Literacy Bags aided the children's understanding of the book was examined and common trends noted. As a researcher, I kept a journal and anecdotes (Appendix G), to document my visits to the classroom scheduled twice a week for each

classroom. Teacher interviews were scheduled each Friday of every week for 20 minutes. Teachers answered questions in the teacher interview where they kept a tally of visits to the math center and if they observed an increase in math-related play. The types of math play were observed and documented as well as what materials the children used.

Analysis of Data

Hypothesis 1- Relationship of Take-Home Math Literacy Bags on ELL preschoolers' math skills

It was hypothesized that the use of Take-Home Math Literacy Bags would increase ELL preschoolers' math skills in counting, shape recognition, and use of mathematical vocabulary. Data collection for this hypothesis included pre/post math assessment interviews, researcher journal and anecdotes, and teacher notes.

To measure the children's math skills in counting and shape recognition, the researcher conducted a one-on-one interview with each preschooler using pre/post assessment interview (Appendix E and Appendix F) designed by the researcher. Each child's pre/post assessment interview was scored for counting skills and shape recognition. A mean score was computed for the children who participated throughout intervention and used the Take-Home Math Literacy Bags. "The mean is the arithmetic average. It is found by summing all scores, and then dividing by the number of subjects." (Goodwin & Goodwin, 1996, p. 93). The quantitative data was then inserted into a bar graph that showed the difference in scores according to the pre/post assessment results for each classroom.

Data collected in the 3-year-old class showed two students with no gains at the conclusion of the study, and two students in the 4-year-old class showed no gains in

shape recognition. One 3-year-old student did not gain any skills in shape recognition and the other 3-year-old student was proficient in recognizing and identifying shapes at the pre-assessment interview. For shape recognition, data results are presented in Figure 1 with the 3-year-old children showing a mean gain of 3.98 and the 4-year-olds showed a mean gain of 1.69. For counting skills, data collected in the pre/post assessment interviews for the 3-year-old class showed a mean gain of 1.5, and the 4-year-old class showed a mean gain of 1.89 for counting skills. Figure 2 displays this data for counting skills.

Figure 1

Pre/Post Shape Recognizing Assessment

n=9 four-year-old students in study

n=4 three-year-old students in study

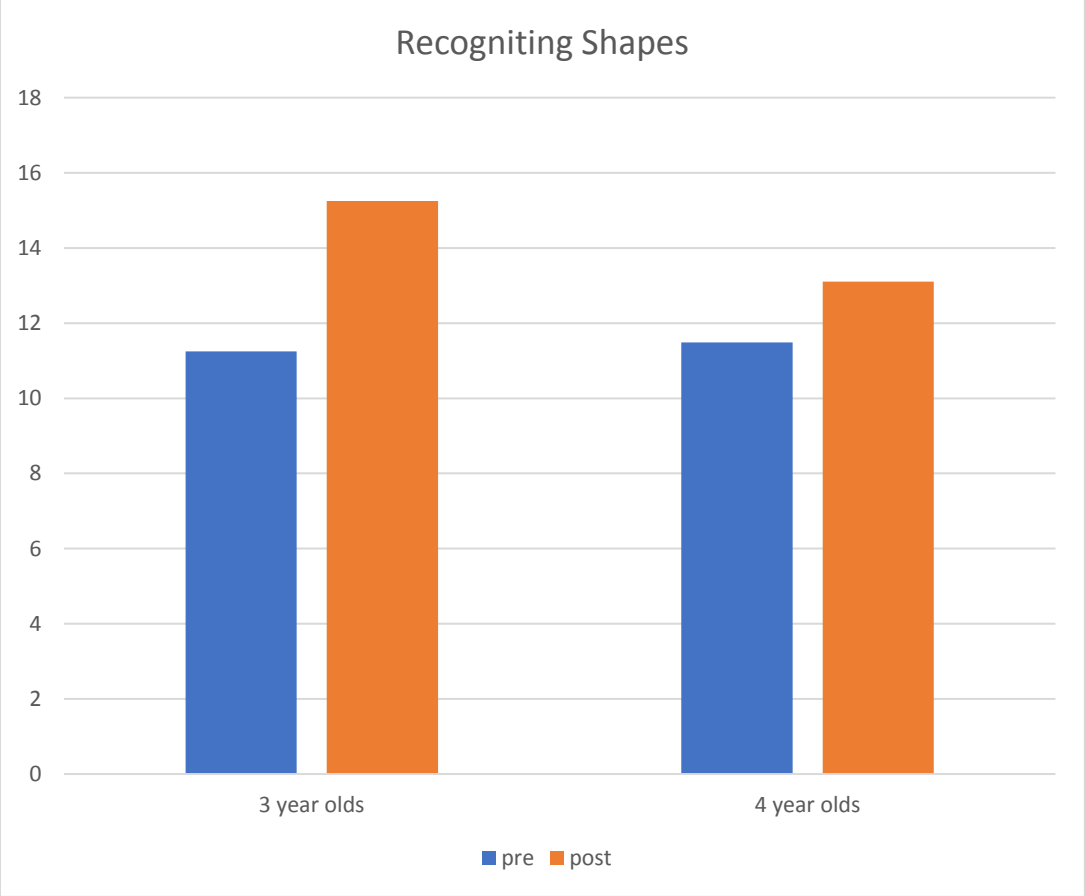
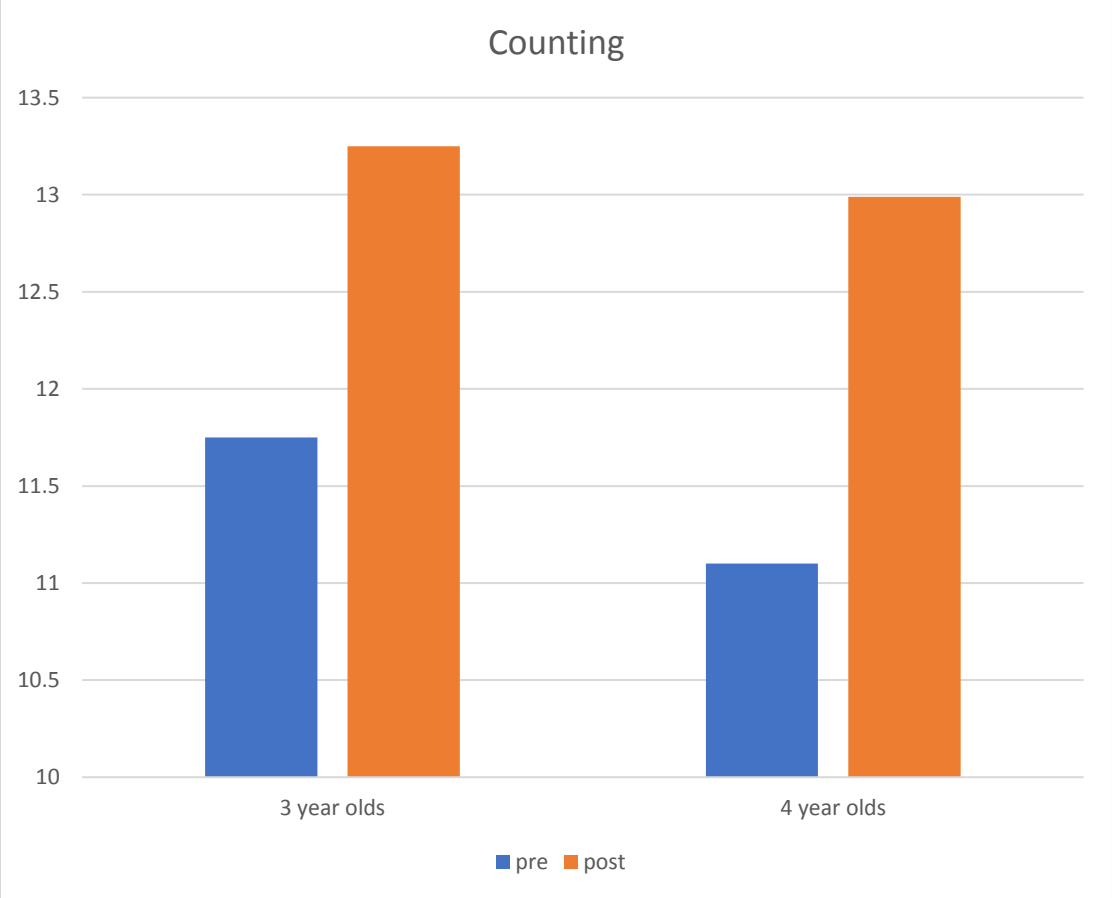


Figure 2

Pre/Post Counting Assessment

n=9 four-year-old students in study

n=4 three-year-old students in study



The researcher kept a journal with anecdotes (Appendix G) during visits to the classrooms as well as with information gathered as families commented on their experiences at drop off and pick up times. To analyze these notes, the researcher first reviewed notes of comments documented in the researcher journal made by parents at drop off and pick up times that related to their counting and shape recognition experiences at home with the Take-Home-Math Literacy Bags. Eight journal pages were collected in total, one per visit to the classrooms. The data were classified, and color-coded according to mathematical skill observed during play or comments made by families by counting skills or shape recognition observations noted in the journal. The data collected were then analyzed to identify any common trends in the children's ability to count and recognize shapes.

Some of the comments received from the parents indicated the children showed interest in shape recognition and counting skills at home. Parents stated that they enjoyed the activities despite their lack of time. I examined their responses, and some comments indicative of this theme of interest and math activity at home are noted here:

"XXX loved the funny monkeys." "We are counting all of the caps at home; we have so many."

"We loved the book so much that we went online and ordered the same book to keep at home, and we found the video too. We read the book three times". (Pete the Cat and his 4 Groovy Buttons")

The teacher notes were then reviewed to identify any information about children's math skills. Unfortunately, the teachers focused their notes on children's engagement

with math materials in the classroom and there was insufficient data to analyze regarding the children's math skills in counting and/or shape recognition.

Hypothesis 2: Relationship of Take-Home Math Literacy Bags on preschooler's interest and involvement with math materials in the classroom

It was hypothesized that using Take-Home Math Literacy Bags would increase preschooler's interest and involvement with math materials in the classroom. Data collected included researcher journal and anecdotes, and teacher interviews and notes.

The researcher kept notes in a journal (Appendix G) on informal observations of children's visits to the math center or math-related play during weekly researcher visits to both classrooms. A tally of how many children visited the area during the researcher observation and math-related play was kept and compared for the four-week duration of the study. This data indicated that students increased visits and engagement in the math center during the second, third and fourth week of the intervention. During the second week of the intervention, increased visits to the math center and manipulatives area were observed by most of the children in the 4-year old classroom. On one of the visits, a group of 4-year old children were playing in the art area with playdough and straws: one of the students makes a diamond shape, while the other is piling straws on the playdough counting along the way. Data collected from the teacher's notes and observations by the researcher noted during visits to the classroom (Appendix L) were classified by skill, red for counting and green for shape recognition. The teacher notes indicated more involvement with shape recognition and shape related play. Teachers kept a tally of visits to the math center, and it was noted that the visits increased, and students spend more time engaged in mathematical play. The results of data collected support the hypothesis

that the Take-Home Math Literacy Bags would improve children's math skills when parents show consistency in their involvement at home. Increased mathematical vocabulary was also noted in children's conversations.

During the first week of the study, the researcher observed no visits to the math center in the three-year-old class. I examined observations documented in my visits to the classrooms (Appendix L) and tallied the number of visits to the math center in the 4-year old class. I found that during the first week of intervention only two boys would stop look at the materials spend about five minutes handling the materials and move to another center. During the second week the same two boys and a group of three girls playing with playdough right across the math center clean up and decide to join the boys to play a game of bingo shapes. The interaction was dynamic, and the children spend 10 to 15 minutes playing the game before they cleaned up and moved to different centers in the classroom. The second week of the intervention a group of girls in the 4-year-old classroom were counting large beads placing them in rows, one child dumps the crayons on the table and uses the cans to fill them with the beads as they count and sort them by color. By the end of the study, there were always at least two students engaged doing different mathematical task in the math center. Prior to this intervention, the math centers were rarely visited by the children unless it was encouraged by the teachers.

During one of the visits to the classroom the researcher observes a child arriving late to the classroom and in need of having breakfast as stated by the mother. The teacher serves a fruit salad bowl, and the 3-year-old student begins to arrange his grapes, strawberries and melon chunks in a circle shape calling the teacher:

"*Look, look, I made a circle*."

The last method used to assess preschoolers interest and involvement with math materials in the classroom was the teacher interview. The researcher collected four teacher notes, two from the 4-year-old classroom teacher and two for the 3-year-old classroom teacher (Appendix N) during the four weekly interviews with the teachers. The teacher interview consisted of four questions related to increased visits to the math center, increases in math-related play, what type of math play was observed, and what materials children used during play.

I classified the notes from the teacher interview (Appendix O). The teacher for the 3-year-old's classroom provided only two of the teacher interviews, and the teacher for the 4-year-olds' classroom provided all four interviews. Based on the answers to the questions on visits to the math center, Week 1 of the intervention had no visits to the math center for the 4-year-olds and some for the 3-year-olds. By the end of the study, a yes response was consistent in the following interviews for both classrooms. Question 2 related to math-related play. The 4-year-olds' teacher noticed three boys counting each other's buttons while lining up for outdoor play and counting the caps hanging in the tree by the science center. These two activities observed by the teacher were related to two books included in the Take-Home Math Literacy Bags. Answers to what types of math play was observed showed an increase in counting materials in the block and manipulative areas. Teachers noted that props related to the books were regularly used by most of the children and an increase in counting skills at meal times was noted in the 4-year-old class.

The teachers were given the option of taking notes or using the camera to capture any math-related play and provide evidence of children's increased interest in math-

related play. The teacher in the 4-year-old classroom took a picture of four children playing with playdough and straws where one girl constructed a diamond shape, and three others piled straws on a chunk of playdough as they counted the straws. I separated the teacher's interview into two piles along with notes, and evidence collected (one picture). Each teacher interview (Appendix O), and notes (Appendix N) were read thoroughly, and commonalities were noted

I met with the 4-year-olds' teacher for the four-week duration of the study; the 3-year-olds' classroom teacher was available for interviews the first and last week of the intervention. I kept notes in my journal of their observations and comments during the interview. Both teachers kept a tally on how many times a child would visit the center or used the materials related to the books added to different learning areas in the classroom. I examined each teacher's tally records, and the results indicated an increased in visits and engagement with math materials in both classrooms. Their observations and comments also indicated that involvement with math materials in the classroom was more evident in the math center, the manipulative and block learning areas and at meal times particularly with fruits and dry snacks where children initiated counting and arranged their snacks in geometric shapes in the 4-year-olds' classroom. In the notes collected during the interview, the teacher noted more involvement in the math and block centers particularly with games with shapes. The 4-year-olds' teacher observed increased involvement from girls that rarely visited the math center. The researcher reviewed the answers to what types of math play was observed in the in the classroom, and the results indicated that 3-year-old students spend more time involved with shapes as opposed to the 4-year-old class spending more time with tasks related to counting.

Hypothesis 3: Relationship of take-home math literacy bags on family supporting their children's math skills at home

It was hypothesized that if families used The Take-Home Math Literacy Bags, they would support their children's math skills at home. In order to measure this hypothesis, the researcher used family experience surveys (Appendix B), pre/post parent surveys (Appendix D & K), and the researcher also kept a journal and anecdotes (Appendix G) of visits to the classroom and comments made by families at drop off and pick up times.

The family experience surveys were sent every week in each Take-Home Math Literacy Bag. The families would return the surveys as they returned the bags. The survey was used to assess how the bags were used and how they helped families support their children's math skills at home. The researcher took the surveys and wrote down the responses to the five questions in the family experience surveys that sounded similar. The most common responses were put together to gain insight on how the families used the Take-Home Math Literacy Bags. Of the 13 families that participated only two families took three bags throughout the study as they did not return the bags on time. All families returned and responded to all the questions in the family experience surveys, and their answers were grouped by storybooks. I compared all the answers in the surveys to identify similarities and/or differences in their answers. Question 1 referred to when families read to the children, and the surveys indicated that families read to their children on Sunday nights mostly and five families read to their children before bed during the week.

The second question asked parents to respond on how the strategies that were provided during the workshop help them read to their children. It was found that the four families that attended the workshop responded that Take-Home Math Literacy Bags provided them with the right strategies to help them read to their children. The families that did not attend the workshop left this question unanswered. Question three asked families if they enjoyed the activities provided in the Take-Home Math Literacy Bags. Responses indicated that families enjoyed the experience and found that the strategies and activities provided in the Take-Home Math Literacy Bags gave them an opportunity to spend more time together with their children

"Me encantan, es una manera linda de trabajar juntos"

("I love them, is a beautiful way of working together"),

"Yes, we all enjoyed this book, the shirt activity was fun."

Question 4 asked families to respond if the math literacy bags were useful in helping their children counting and recognizing shapes. Of the 13 surveys collected 12 surveys indicated that families found the Take-Home Math Literacy Bags helped their children counting, recognizing shapes and increased their interest in math play.

"Absolutely, would love more books."

Families also had the opportunity to write what they like or did not like about the experience and some of the comments noted in the survey indicated that most families enjoyed this interactive activity with their children, but found it difficult to make time for it.

"Although I like this activity, it definitely was difficult to find time as a working parent. By the time I picked up the kids they are tired or exhausted from a full day of childcare

and are just ready to eat, unwind, bathe and go to bed. This definitely pushed me to make time to play with them."

A tally chart was created to determine how many parents felt the activities provided in the bag were useful in helping their children with counting skills and shape recognition. The results showed that 11 parents felt the activities helped their children with their mathematical skills and two parents did not provide an answer to the question.

Another data collection used was the family pre-survey which consisted of questions about how often they read to their children, what language they used when reading, the types of books that were being read, and the types of materials used at home. Thirteen families completed the pre-surveys, four families completed the surveys at the take-home math literacy workshop conducted by the researcher, and the other nine families were asked to respond to the questions at drop off. Question 1 asked families to respond how often parents read to their children. It was noted that eight families read to their children two or more times a week, four families read one-two times a week and one family read zero-one time a week. According to the data, families read to their children in both languages English/Spanish mostly and one family only in Spanish.

Question 3 asked parents what types of books they read to the children and their answers varied. I wrote down their responses and grouped them by category. Parents responded they read Disney books, classic children stories, books about shapes, animals, nature, family, the Bible, sleepy time books and fairytale stories. One family did not respond to this question. Question 4 in the survey asked parents to list what type of school materials they had at home. I grouped their answers by the type of school materials most used by the families. Books and colored pencils were most used by

families; one family had scissors, two families responded they used the website ABCMouse.com as an education tool, one stuffed animals, one easel, blocks and a tablet. The last question asked parents how much time they spent with their child engage in particular academic activities in a given week. I created a tally of parents' responses to that question and calculated a percentage of the time parents spend with their children engaged in academic activities during the week. The data showed that 39% of families spent 1-2 times a week, 46% of families spend 3-4 times a week, and 15% stated they spend one hour seven days a week.

The family post-surveys were distributed to the families at the end of the study. Ten families attended a scheduled meeting to conclude the study and respond to questions in the post-survey, refreshments were provided at the meeting. The post-survey asked questions about how the family's method of reading changed after using the Take-Home Math Literacy Bags, how regularly they engaged in mathematical activities using the bags, about their experience with the activities, if the materials provided aided their children's understanding of the book and to make suggestions about future workshops concerning math literacy. Families had the opportunity to meet other parents and shared their experiences with the Take-Home Math Literacy Bags. It is worth to note that only four families attended the take-home math literacy bags introductory workshop, as opposed to the 10 families that participated in the meeting at the end of the study. The family post-survey was provided to the parents that were unable to attend the final meeting at the conclusion of the study but were not returned by the families.

The responses from the family post-surveys were examined to see if parent's method of reading had changed after using the take-home math literacy bags. I created a

tally chart to determine how many parents stated if their method of reading had changed after using the take-home math literacy bags. One parent responded No, three parents responded yes, and the other parents included comments such:

"*It gave me more ideas on how to explain the images in the book."*

"Con juegos y señas" (With games and signs)

"*Mucho"* (a lot)

"*A little bit, my son was already interested in math and numbers."*

"We usually read to XXX, but the program has made it more consistent-priority."

"Si, cambiaron extremadamente para el bien de ella") ("Yes, it was an extreme change for the best")

Question 2 asked parents to respond as to how regularly they engaged in mathematical activities with their children. Parents marked more than one answer on how regularly they engaged in mathematical activities. The responses were tallied, and the results showed that 9% read once a week, 27 % twice a week and 64% on weekends. Question 3: how did you and your children feel about the activities? All 10 families responded they enjoyed and liked the activities and that they felt their children's understanding was enhanced by using the activities in the Take-Home Math Literacy Bags. Question 4 asked parents if they felt the materials provided in the Take-Home Math Literacy Bags aided their children's understanding of the book. Each of the comments was read thoroughly, and commonalities were noted. For this question, 100% of the comments written by the families felt the materials were very helpful and easy to use. The last portion of the survey asked the families what kind of workshops they would like to see in the future. I grouped their responses by category. It was noted that they

would like to see workshops following recipes, 100-day project, classifying animals, addition and subtraction and games with geometric shapes. One parent stated they would continue on their own following the same format at home.

I wrote down comments in the researcher journal that were made by families at drop off and pick up times throughout the duration of the study. I read and analyzed their comments, and common trends were noted. Comments made by the parents indicated that they felt very excited about how interactive their experience was with their children. Three mothers indicated it was very difficult to find the time. However they felt the Take-Home Math Literacy Bags helped their children be more interested in math, one mother would request more books to read with her child, another bought the same books to keep at home, families stated that they would like this type of activity to continue as a regular part of the program. These findings indicate that the Take-Home Math Literacy Bags had a great impact on helping families support their children's math skills at home.

A tally chart was created with answers collected from the family experience surveys to determine how many parents felt the activities provided in the bag were useful in helping their children with counting skills and shape recognition. The results showed that 11 parents felt the activities helped their children with their mathematical skills and two parents did not provide an answer to the question. The results showed that Take-Home Math Literacy bags had a positive impact on families helping their children develop their mathematical skills.

Additional Research Questions

In addition to the formal hypothesis of this study, the teacher-researcher was also interested in some related questions and observations.

What effect does attendance at a family workshop have on preschooler's literacy math skills development? Do children whose family member attended the workshop have greater increases than those whose families only used the take-home bags without attending the workshop?

For this study only four families attended the family workshop. However the researcher approached six families individually throughout the course of the first week of the intervention at drop off and pick up times and explained face to face the purpose of the study, two families were not reached. Parents stated they did not attend the workshop due to work constraints and other prior commitments. Of the four families that attended the workshop, one finished their enrollment prior to the completion of the study, so data was not counted as part of the research study. One family was very engaged in reading prior to the intervention, and the student was already proficient in math and had no gains in the post-assessment, one family did not participate fully in the study and data collected in the study showed no gains in mathematical skills for this child. One family that attended the workshop participated fully in the study, and their child showed gains in counting and shape recognition and increased vocabulary.

Data collected in general showed increased visits to the math center and math-related play for these two students. Of the families that did not attend the workshop but were approached at drop off and pick up times, one had the most gains as shown on the post-assessment data collected. Based on the analysis of all collected data, children of

family members that attended the workshop or had a face to face instruction on the purpose of the study showed greater increases in math skills and more interest and engagement in mathematical play than those families who only used the take-home bags without attending the workshop.

Summary of Results

Findings from the present study indicate that the Take-Home Math Literacy Bags had a positive effect on the home environment of Latino preschoolers as well as increased interest in math-related play in and out of school. Anderson, Anderson, and Gear (2015) documented over the last three decades how families can play important roles in children's early literacy development. Evidence from their study indicated that: these programs can have a positive effect on children's language and literacy development that is sustained into the elementary school years; parents value them, and they can also help teachers and schools understand the lived experiences of culturally and linguistically diverse families and families living in challenging social situations.

Results of data analysis revealed that most children also increased their skills in counting and shape recognition. Mean scores on assessments indicated a modest increase in both the 3-year-olds and 4-year-olds who participated in the study. Analysis of the researcher's journal provided evidence of the students counting and using shapes and often linking their actions to the stories from the Take-Home Math Literacy Bags.

CHAPTER V

Discussion

Based on the results of this study, Take-Home Math Literacy Bags may be an effective vehicle to improve preschooler's math skills in counting and shape recognition. They may also increase family participation in and out of school in supporting their child's educational growth. Take-Home Math Literacy Bags appeared to have a positive effect on Latino families supporting their children's mathematical skills in counting and shape recognition.

In this study, there were several limitations that may have impacted the results and may limit generalizability. The following discussion explores the implications of the findings as they relate to the hypotheses of this study.

Hypothesis 1- The Impact of Take-Home Math Literacy Bags on ELL preschooler's counting and shape recognition skills

Findings from the present study indicate that The Take-Home Math Literacy Bags had a positive impact on ELL preschooler's counting and shape recognition skills as well as increased mathematical related play as measured in the post-assessment interview and all data collected. The Take-Home Math Literacy Bags were designed to build on the mathematical knowledge particularly in counting and shape recognition of Latino preschoolers 3 to 5 years of age. This finding was consistent with both counting and shape recognition. However, 3-year-olds showed greater gain in recognizing shapes and 4-year-olds showed greater gains in counting. This may be because the number of children in the two age groups was different with more 4-year-old students in the sample than 3-year-olds. Regarding shape recognition, 4-year-olds had a higher mean in pre-

assessment than 3-year-olds meaning that 4-year olds already know more shapes thereby causing less of a gain. Conversely, for counting, the mean during pre-assessment was higher for 3-year-olds than for 4-year-olds. While one would expect the 4-year-olds to be higher at pre-assessment because of age, the mean may have been higher simply due to the difference in sample sizes of the two age groups and a child scoring particular higher or lower than their peers.

These findings are consistent with O'Donnel and Kirkner's (2014) study on the impact of well-designed family involvement programs and improved outcomes for children especially new Latino immigrants or monolingual Spanish-Speakers, to increase their participation in their children's education. O'Donnel and Kirkner (2014) also found family involvement to be a beneficial factor in young children's learning, calling for the promotion of effective partnerships between homes and schools. The impact of a program designed to build on the mathematical knowledge that prekindergarten and kindergarten children bring to the classroom (Clements, Ginsburg & Ertle, 2015) showed that users of Big Math for Little Kids (BMLK) learned more mathematics than did children that used the business-as-usual curriculum (BAU). This finding is consistent with the positive impact The Take-Home Math Literacy Bags results showed, as these bags were intentionally designed to increase mathematical knowledge and interest in and out of school for Latino preschool children.

Hypothesis 2- The Impact of Take-Home Math Literacy Bags on preschooler's interest and involvement with math materials in the classroom.

As anticipated, children interest and involvement with math materials in the classroom increased. Post-assessment interviews indicated gains in mathematical skills in

both counting and shape recognition for most children in both classrooms. This increased interest in playing with math materials in the classroom was perhaps due to the familiarity of objects in the classroom related to the Take-Home Math Literacy Bags sent home and parental involvement with the activities included in the bags. Teachers' interviews indicated that involvement with math materials in the classroom were more evident in the math center, the manipulative and block learning areas and at meal times where children used some vocabulary words included in the take-home activity cards during their interactions. The two teachers in both classrooms noted and suggested in their notes to the researcher that they felt very excited about the math play that was observed in the classrooms.

The 4-year-olds' teacher stated that math play had helped a child with challenging behavior patterns. This particular child was engaged for more extended periods of time in the math center and was a regular visitor. His behavior improved as a result of the familiar math objects and new challenging materials that were added in the different learning areas. Dobbs and Robinson (2012) investigated the association between children's mathematical skills and their behavior in a study conducted at a Head Start program. The results of their study showed that behavioral profiles of young children are related to their mathematical achievement in important ways. Approaches to learning showed a strong relationship to mathematics, whereas prosocial behaviors, internalizing behaviors (e.g., aggression and anger) and externalizing behaviors (e.g., sharing with and comforting others), relationships with mathematical skills disappear after counting for approaches to learning.

Prior to the beginning of the study, I visited the classrooms and added the new materials that the children would become familiar with through the Take-Home Math Literacy Bags and added more math related materials for children's play. I followed guidelines suggested by many studies to increase mathematical skills in children and to provide valuable resources to the families of the participants to continue their involvement at home. Varol and Farran (2006) offered guidelines that would assist teachers as they teach mathematics to children between the ages of 5 and 7. Some of these guidelines included: providing challenging learning environments that don't limit any child's access to challenging mathematics instruction. The study made reference to the beliefs of many seminal voices in the field of early childhood education, including Montessori, Plato, Pestalozzi, Froebel, Owens, and Dewey, about their assertion that mathematics should be introduced to young children through objects. I also believe the children increased their interest in playing with math materials when familiar objects related to the books were included in different learning areas, and the math center was re-arranged to include more math materials and teachers were more aware and intentional about scaffolding math-related play.

The classroom discourse is another factor discussed by Varon and Farran (2006), noting that in student-centered classrooms, one strategy that can be useful in helping students learn mathematics is engaging them with interesting classroom discussions. It was suggested in the analysis, that teachers provide concrete materials and help children connect those materials with effective and developmentally appropriate mathematical tasks. The final factor noted in this particular research was the quality assessments that

enables teachers to obtain information about student's skills and potential, to improve instruction, and to provide feedback to students.

Hypothesis 3- The Effects of Take-Home Math Literacy Bags on families supporting their children's math skills at home.

The families were given one workshop on how to use the take-home math literacy bags prior to starting the study. Attendance to the workshop was less than expected with only five families participating. Families that were unable to attend the workshop were approached at drop off and pick up times and informed of the process. The results of the study conducted by (Kocyigit, 2014) showed that teachers and administrators organized various family involvement activities within the contest of family educational activities and parents participated in one or more of them. Family involvement activities were found to be affected by factors such as time, cost, interaction, order, sharing getting familiar with each other, ease of transportation, updated noticed boards, technology, school facilities, security, control, requirements and participation size. It was vital for me to reach out to all families, so I decided to approach one by one at drop off and pick up times and explain briefly (due to families' constraints with time) about the Take-Home Math Literacy Bags program. I encouraged families to reach me via e-mail if they had any questions or face to face during the length of the study. At the conclusion of the study, I invited the families to a meeting to share their experiences and fill out the family post-survey. I was pleased to see that ten families attended as opposed to the four initial families that were present at the introductory workshop. Kocyigit (2014) stated that the first place where children reveal their inherent potential and acquire new behaviors is at home. Kosyigit (2014) goes on to note that families wish to know how they can

contribute to their children's education and he stresses that educators need to develop a more comprehensive program which covers the school, families, and society.

Based on the family experience surveys, parents were very excited about the benefits of the program. Participants agreed unanimously that their involvement yielded success for their children math skills development and in the interactive nature of the Take-Home Math Literacy Bags. At the workshop, parents were given surveys that asked parents what types of books they read to their children and how much time they spent with their children engaged in particular academic activities in a week. It was found that most families read Disney and storybooks and the time spent with academics was mostly reading once a week. Participants indicated that they enjoyed the math activities and math-related storybooks. It was suggested by several families to continue the Take-Home Math Literacy bags beyond the study.

Regardless of family's socioeconomic status, parents are interested in their children's academic success (Best & Dunlap, 2012). Schools that fostered productive relationships with all stakeholders place a strong emphasis on understanding and addressing class and cultural differences. The current study found that when schools or programs nurture relationships that value cultural differences family engagement in supporting children's development increases. Decades of research have consistently demonstrated that family engagement in a child's education is strongly associated with positive outcomes according to Best and Dunlap (2012). As stated in their article, data showed that this is true even across cultures and countries regardless of socioeconomic circumstances were children will see greater academic success. I believe this is true based on the family participants in this study. This article also pointed out that despite the

positive outcomes associated with family involvement, many schools and districts still struggle to cultivate meaningful relationships with the community members.

In my role as director of the program, I strive to cultivate respectful and collaborative relationships with parents. When I saw the low turnout to the introductory workshop, I changed my approach yielding positive outcomes for the children and their families participating in the study. There was overwhelming data that showed that supported this hypothesis. It was evident in the pre/post student interviews, the family experience surveys and pre/post parent survey that supports evidence that the Take-Home Math Literacy Bags have a significant positive impact on the children's mathematical skill development. It was reported in the family experience surveys that the activities helped parents support math education at home. Some parents indicated that it was difficult to make time, but that the activities sent home pushed them to make the time for their children. Families also reported that the Take-Home Math Literacy Bags brought them closer as they conducted the activities at home. The family post-survey indicated unanimously that parents enjoyed the activity. It was also noted that parents checked off more than two answers to the question related to how many times they read to their children.

O'Donnel and Kirkner (2014) found significant improvement in the frequency and quality of family-teacher interaction. The study also found that Latinos may be less culturally inclined to contact teachers, given their belief or perception that their children's education is the job of the schools and teachers. These are significant findings because the family-school connection has been linked to better educational outcomes for students. Latino families preferred to engage more in-home school activities rather than school-

based. In my visits to the classroom, I observed parents occasionally walking with their children to the math center specifically at a late drop-off. O'Donnel and Kirkner (2014), research study also concluded that more frequent participation in the family involvement program was significantly and positively predictive of social skills and work habits at the end of the one or two years. The authors noted that participation in the family program helped Latino families and schools reach their educational goals. Based on the findings in my study the Take-Home Math Literacy Bags had an impact on children's mathematical skills in counting and shape recognition as well as increased parental involvement.

Additional Research Questions

The findings on the additional research questions were inconclusive and not measured as the children of parents that did not attend the workshop had gains in their mathematical counting skills and shape recognition. This may be to my approach of meeting parents that were unable to attend the introductory workshop face to face at drop off and pick up times and received a brief one on one instruction on the purpose of the study to increase their participation in their children's education. Anderson et al. (2015), found that 20 years after the family literacy program had been implemented, families felt that being able to observe the modeling of adult-child interactions by the facilitators and other parents was crucial. Other families saw the benefit of having the program in both languages English and Spanish.

Conclusions

The purpose of this study was to examine the effects of parental involvement on children's math skills and to increase family participation in and out of school. In addition, the purpose of this research study was to provide parents with support, training, and resources to view participation in and out of school activities as an important step in

meeting children's educational needs, particularly in mastering and understanding mathematics and literacy skills, for future academic success.

Based on all of the data collected, the study showed that using Take-Home Math Literacy Bags improved children's counting skills and shape recognition. Parental involvement increased and it was noted in the family surveys that families enjoyed the activities and provided them with resources and strategies that enabled them better to help their children mastering math skills. Data also showed that families unanimously agreed that their involvement yields success for their children. This success was more evident because the families felt supported and appreciated the flexibility in the face to face meetings allowing them to fully participate in the study. Kocyigit (2015) made reference in his study on the problems and solutions for family involvement that teachers and administrators want to know how to work effectively with families and ensure social involvement to increase student success. Similarly, families wish to know how they can contribute to their children's education and efficiently communicate with their teachers. Kocyigit (2015) also stated that the most significant responsibility for ensuring family involvement rest with teachers, and I might add that administrators as well. The positive attitudes and behavior shown by teachers and administrators play a crucial role in ensuring effective, suitable an active family involvement in preschools. I could not agree more. I understood that I needed to carefully plan and organize this research to ensure the full cooperation of teachers and families. I met many families face to face when they were unable to attend the introductory workshop, and this resulted in more participation from families.

Other families that were bilingual or just beginning to learn English stated that the bilingual nature of the Take-Home Math Literacy Bags made them feel more confident when it came to read and interact more with their children at home. Wessels (2014) explored the effects of an eight-week bilingual family literacy program for Latino, English learning families. The study found that parents increased the amount of time they spent reading and conducting activities with their children. Similar results were found in this study as reported by the parents in the family experience surveys and family post-survey data collected.

Anderson, Anderson and Gear (2015) proposed that family literacy program can build on the strengths that families bring and provide an intersubjective space where families and schools can share knowledge in a reciprocal, respectful manner. The findings of this research support this notion. Families appreciated the materials being available in both languages. It is my job to provide families with as many opportunities possible to participate in their children's education. Based on the responses in the family experience surveys, The Take-Home Math Literacy Bags gave families the tools need to improve their children's mathematical skills. Evidence collected in this study also indicates that these types of programs can have a positive effect on children's mathematical and literacy skills; and as the research conducted by Anderson, Anderson and Gear (2015) found these programs can also help teachers and schools understand the lived experiences of culturally and linguistically diverse families and families living in challenging social situations.

Educational Implications

Perhaps the most important factor in improving young children's mathematical knowledge and skills is to increase family involvement as families have a major impact on young children's achievements. Family participation in extending learning, setting expectations, and building cultural capital outside of school is vital to the success of Latino students, especially in the area of mathematics. The overwhelming disparity in mathematics achievement between Latinos and their majority group peers can be closed if teachers, administrators develop programs that are culturally sensitive and addresses the needs of these communities. Emphasizing the importance of understanding and using mathematics, the NCTM noted that "in this changing world, those who understand, and can-do mathematics will have significantly enhanced opportunities and options for shaping their futures. Mathematical competence opens the door to productive futures (Varol, Dale & Farran, 2006). An important value of using Take-Home Math Literacy bags was extending children's interest and engagement with math materials in the classroom. This study showed significant gains in counting skills and shape recognition in a short period of time supporting previous research that when parents are provided with adequate resources and materials like the Take-Home Math Literacy Bags, families become more involved in children's learning. I would suggest that mathematics proficiency becomes a priority in early childhood programs if we are to close the achievement gap among the Latino student population in the US. Many studies I review in preparation for my research suggest that more and broader strategies are necessary including the provision of preschool and parent programs to support early numeracy

development similar to those advocated for literacy (Lopez, Gallimore, Garnier & Reese, 2007).

At the beginning of this study children seldom visited the math area. Literature reviewed in previous studies indicated that in order to help children develop mathematical understanding many factors need to be taken into consideration: Parental involvement is key but also the learning environment needs to be an environment that provides challenging mathematics instruction. I observed how classroom resources and the materials related to the Take-Home Math Literacy Bag's that were added to the math area and other learning centers improved children's mathematical skills and increased regular visits to the math center and math-related play. I must emphasize that teachers must change their beliefs and attitudes towards mathematics and strive to provide more challenging mathematical curricula that goes beyond counting and shape recognition. It is important to note that teacher's self-efficacy believes are linked to children's academic achievement. Teachers have the power to transform classrooms into learning environments that advance students in mathematical achievement. Although the teachers in both classrooms scaffold children's learning I believe that with more professional development in the area of mathematical development teachers could have engaged the students with more interesting discussions.

I believe the Take-Home Math Literacy Bags were successful in two ways. First, it served to help parents to view participation in and out of school as an important step in meeting children's educational needs, particularly in mastering and understanding mathematics and literacy skills for future academic success. Second it helped me as a researcher and teachers to use the knowledge of home to enhance the children's

mathematical learning at school. Kyle, McIntyre & Moore (2001) described how their project was able to connect with their students and their families in meaningful ways to support mathematics achievement. I obtained similar results through this research study. I believe that activities like Take-Home Math Literacy bags can support understanding in young mathematicians and can also help close the achievement gap among Latino students.

Limitations of the Study

There were many limitations during the course of the study. The participation of the families could have been better. The original sample consisted of 17 preschoolers 3 to 5 years old and I concluded the study with 13 students. Another limitation of the study was that one of the teachers took a leave of absence and a novice teacher took over the classroom and provided limited anecdotes and observations during the teacher-researcher interview. There also was the limitation of the study's sample size, which was small, and the research was conducted with urban preschool children. A larger sample would have yielded more robust findings and formed a better picture for analysis. A small sample prevents the findings from being generalizable.

Another limitation of this study was the full participation and involvement of the teachers. I believe that if the teachers had received professional development that included intensive workshops with technical assistance the outcomes for the children would have been greater. The review by Gunderson, Ramirez, and Levine (2011) on different research studies focused specifically on parents and teachers, as they represent two major environmental influences on children's development and are particularly important for the formation of academic attitudes. The researchers found that adult's

expectancies and attributions are not the only attitudes and behavior that contribute to children's development of math attitudes. In my visits to the classroom, I observed that teachers' math scaffolding of children's play could have yielded better results if the teachers had employed different strategies to extend learning beyond and increased their curiosity about the math-related play when some of the students showed greater interest. As for families, I would have conducted more workshops to empower parents to continue with the activities at home since parents are generally a consistent long-term force in their children's lives.

In addition to the limitations already mentioned there was the issue of the researcher's role as a director limiting access to the classroom during the full course of the study due to administrative duties. Another limitation was the time of the year the research was conducted. The research study was conducted in May and June. Parents did not return the take-home math literacy bags on time affecting the rotation of the books. In the future, I would like to conduct the research at the beginning of the school year when there may be adequate time to gather data over a longer period of time. Possibly conduct the study when children are 3 years of age and follow their progress for two years.

Implications for future research

This study only measured basic geometric shapes and counting skills. In the future, I would also suggest conducting a research study with Take-Home Math Literacy Bags that include more math-related skills such as measuring, patterning, spatial relationships and more challenging and developmentally appropriate activities. I believe children are capable of more with the support of their families at home and at school.

I would also recommend researching assessment tools that adequately assess children's early knowledge and skills of mathematics to understand their reasoning strategies instead of only assessing whether they can count or recognize shapes. Another recommendation would be to examine the impacts of math professional development for teachers in early childhood settings coupled with a quality math curriculum used. Teacher's mathematical knowledge and training is an area that I feel needs to be research more in depth. As I conducted my study I realized that math learning opportunities where infrequent perhaps due to the limited knowledge and preparation of teachers in this area. This recommendation is consistent with the findings on Presser, Clements, Ginsburg and Ertle's (2015) research on the impact of Big Math for Little Kids (BMLK) research. Their findings indicate that many teachers are not providing the rich environment necessary for quality mathematical explorations. They go on to confirm what I also observed in the two classrooms where I conducted my research that when teachers do actively instruct children in mathematics, it is within a very narrow range of basic mathematical ideas.

APPENDIX A

Family Math Literacy Take-Home Bags

Materials

Book

Directions

Parent Experience survey

Activity cards

APPENDIX B

Family Experience Survey

1. When did you read the book to your child?

   _____

   _____

2. How did the strategies that were provided during the workshop help you reading to your child?

   _____

   _____

3. Did you enjoy the activities that were provided in the math literacy bags?

   _____

   _____

4. Would you say the math literacy bags were useful in helping your child counting and recogniting shapes?

   _____

5. What about the experience did you not like or like?

   _____

   _____

APPENDIX B

Encuesta de la Experiencia Familiar

1. Cuando le leyó usted a su hijo/a?

   _____

   _____

2. Cómo le ayudaron las estratejias aprendidas en el seminario a leerle a su hijo/a?
   _____

   _____

3. Disfrutó usted de las actividades que se le enviaron en la bolsa de

   matematematicas?

   _____

   _____

4. Diría usted que las bolsas de matemáticas le ayudarón a su hijo a contar y reconocer las figuras geométricas?
   _____

   _____

5. Qué le gustó o qué no le gustó de la experiencia
   _____

   _____

APPENDIX C

Take Home Math Literacy Bag 1

NAME:_____ DATE:_____

Book: Caps for Sale

By Esphyr Slobodkina

Contents: Book, activity, and family experience survey

Vocabulary Words: Bunch, behind, under

Parents: Talk about the words and count during the reading of the story and review when finished. Try to use these words over the weekend as you talk with your child about anything.

Activity:

Count the number of caps or hats you may have at home

*****Please do not forget to fill out the family experience survey

APPENDIX C

Take-Home Math Literacy Bag 1 (Caps for Sale)

NAME: _____ DATE:_____

	Comments
Activity 1- Count the number of caps or hats you may have at home. Have your child use tally marks or numbers to represent how many items he/she counted.	

APPENDIX C

Take-Home Math Literacy Bag 2

NAME:_____ DATE:_____

Book: Grandpa's Quilt

By Betsy Franco

Contents: Book, activity, and family experience survey

Vocabulary Words: Long and short, top and bottom

Parents: Talk about the words and count during the reading of the story and review when finished. Try to use these words over the weekend as you talk with your child about anything.

Activity:

Make a paper quilt with the four-square grid provided. Have your child color, cut and glue the grid with triangle shapes in the blank grid template provided. Return to quilt to school.

*****Please do not forget to fill out the family experience survey

APPENDIX C

Take-Home Math Literacy Bag 2 (Grandpa's Quilt)

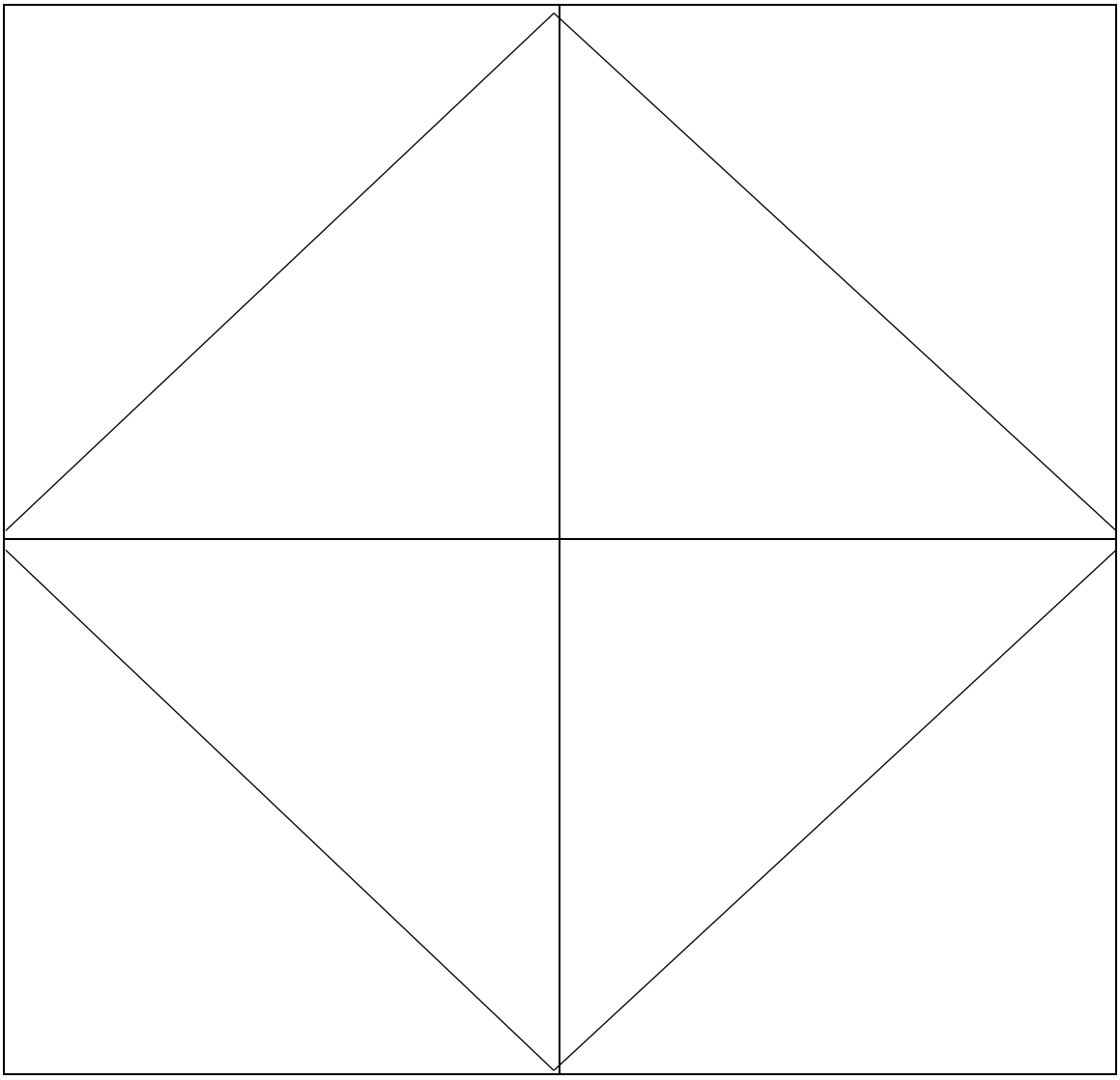
QUILT SQUARE CHALLENGE

APPENDIX C

Take-Home Math Literacy Bag 2 (Grandpa's Quilt)

Color and cut shapes then paste them on the 4-square grid.

See it! Make it!



APPENDIX C

Take-Home Math Literacy Bag 3

NAME:_____ DATE:_____

Book: Shapes, Shapes, Shapes

By Tana Hoban

Contents: Book, activity, and family experience survey

Vocabulary Words: Edges, corners, sides, inside

Parents: Talk about the words and count during the reading of the story and review when finished. Try to use these words over the weekend as you talk with your child about anything.

Activity:

Go on a shape scavenger hunt around the house with your child. Draw the shapes you and your child found in the grid provided.

*****Please do not forget to fill out the family experience survey

APPENDIX C

Take-Home Math Literacy Bag 3 (Shape Scavenger Hunt)

NAME:_____

APPENDIX C

Take-Home Math Literacy Bag 4

NAME: _____ DATE:_____

Book: Pete the Cat and his 4 Groovy Buttons

By Eric Litwin

Contents: Book, activity, and family experience survey

Vocabulary Words: Round, popped off, rolled away

Parents: Talk about the words and count during the reading of the story and review when finished. Try to use these words over the weekend as you talk with your child about anything.

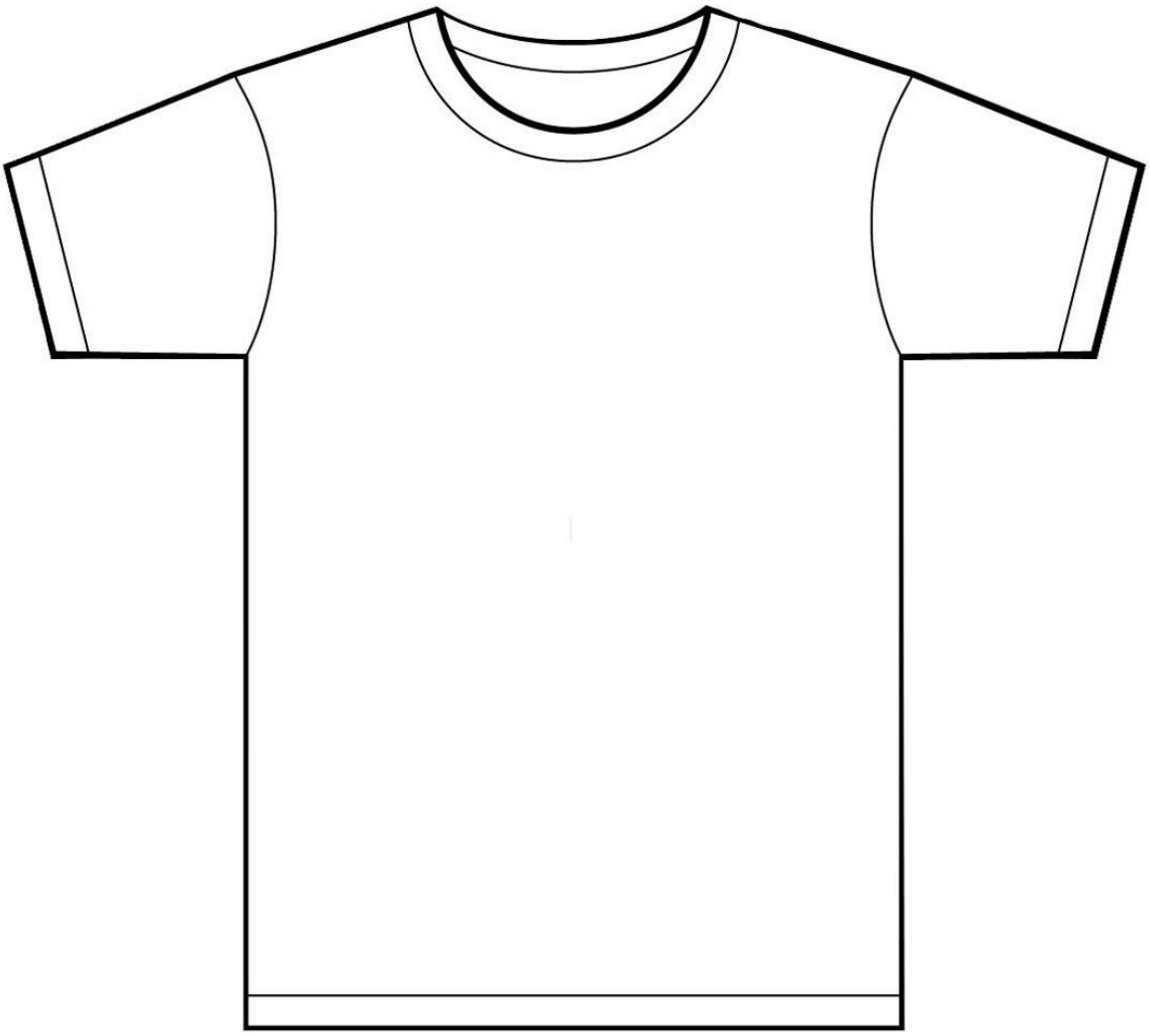
Activity:

Have your child draw as many buttons in the shirt template enclosed.

*****Please do not forget to fill out the family experience survey

APPENDIX C

Take-Home Math Literacy Bag 4 (How many buttons)



APPENDIX D

Family Pre-Survey

1. How often do you read to your children?

A) 0-1 times a week

B) 1-2 times a week

C) 2 or more times a week

2. Do you read to your children in:

A) English

B) Spanish

C) Both

D) Other

3. What types of books do you read to your children?

_____

_____

4. What type of school materials do you have at home for your child?

_____

_____

5. How much time do you spent with your child engaged in particular academic activities in a given week?

APPENDIX D

Encuesta Previa

1. Cuantas veces a la semana le lee usted a su niño/a?

   A) 0-1 veces a la semana

   B) 1-2 veces a la semana

   C) 2 o más veces a la semana

2. En qué idioma le lee usted a su niño/a?

   A) Inglés

   B) Español

   C) Los dos idiomas

   D) Otro idioma

3. Que tipos de libros le lee usted a su hijo/a?

_____

_____

4. Qué clase de materiales academicos tiene usted en la casa para su hijo/a?

_____

_____

5. Cuanto tiempo pasa usted envuelto en actividades academicas a la semana?

APPENDIX E and F

Student Pre/Post Assessment

Conducted in English

NAME_ _____ DATE:_____

1.Numeral Recognition

3	**5**	**0**	**1**	**4**	**2**

7	**9**	**8**	**6**	**10**

2.Counting

0-5	**1-10**	**1-10 +**

3. Give me counters: **3** **5** **6**

Correct _____ Incorrect_____

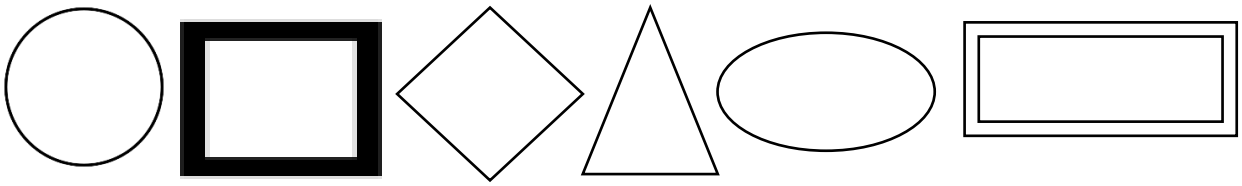
APPENDIX E and F

Pre/Post Assessment (Geometric Shapes)

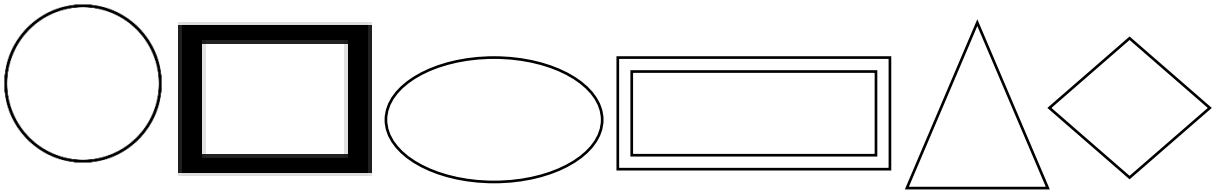
Conducted in English

NAME:_____ DATE:_____

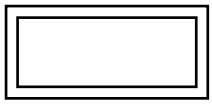
1.Point to the shape



2.With objects. What is this?

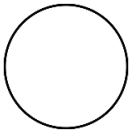


3. Tell me about:

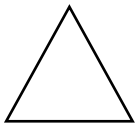


_____

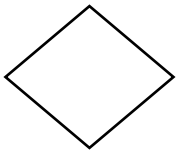
_____



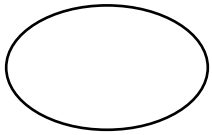
_____



_____



_____



_____

APPENDIX G

Researcher Journal and Anecdotes

Center Time Notes Date:_____

Materials worked with:
Observations:
Quotes:

Appendix H

Family Letter

Dear Families

I am currently working on my thesis as a requirement for my Masters in Early Childhood Education. I am asking for your cooperation at this time. I am interested in developing new and more effective strategies to increase math learning at school and at home. I have created several take-home math literacy bags that include a math related book, activities, a vocabulary card and a family experience survey. I'll be sending a math literacy bag home starting May 15, and continue sending a math literacy bag home each week for four weeks. You and your child will be able to use the math literacy bag for the weekend and return it to school each Tuesday so that other families can use it.

I have reserved the night of Friday, May 12 at 5:00 p.m. to have a workshop in our classroom. The workshop will be about things you can do to support your child's math skills. I'll talk about the take-home math literacy bags and discuss item by item and you will see what they are and how to use them. The workshop should be no longer than an hour and there will be a paraprofessional in the next classroom to supervise the children.

Please let me know if you will be able to attend by e-mailing me at littlepeoplesacademy@verizon.net. If you are unable to attend the workshop, please notify me at the e-mail address above and we can set up a time to review how to use these take-home math literacy bags with your child.

Thank you for your time and collaboration. I hope to see you at the workshop.

Carmen Espinosa

Appendix H

Carta para las Familias

Queridas familias:

En este momento estoy trabajando en mi tesis como un requerimiento para mi Maestria en Educación Infantil. Le pido su colaboracion para este projecto. Estoy interesada en desarrollar nuevas y estratejias mas efectivas para incrementar el aprendizaje en matematicas en la casa y en el jardin infantil. He creado varias bolsas de que contienen un cuento con contenido matematico, una actividad, palabras de vocabulario y una encuesta de su experiencia con la actividad. Enviaré esta bolsa de matematicas a casa empezando el 15 de Mayo, y continuaré enviandola cada semana por cuatro semanas consecutivas. Usted y su hijo/a podrán usarla por el fin de semana y devolverla el Martes para que otra familia la pueda usar.

He reservado la noche del Viernes 12 de Mayo a las 5:00 p.m. para hacer el taller in el salon de clase en el jardin infantil. En el taller le hablaré de las actividades que puede hacer para ayudarle a su hijo con la matematicas. Hablaré de los materiales en la bolsa uno por uno y le indicaré como usarlos. El taller no será por mas de una hora y una de las asistentes supervisara a los ninos en el salon de clase.

Por favor dejeme saber si podrá attender al correo electronico littlepeoplesacademy@verizon.net. Si no puede atender al taller, por favor notifiqueme al correo electronico mencionado anteriormente y podemos hacer una cita para explicarle como usar estas bolsas de matematicas con su hijo/a.

Gracias por su colaboracion. Espero verlos en el taller.

Carmen Espinosa

APPENDIX I

Family Math Newsletter

Parents Newsletter

Little People's Academy, Inc. May 2017

Math all around us

"In this changing world," those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their futures.

National Council of Teachers of Mathematics (NCTM)

Parents make the difference

A home environment that encourages learning is more important to student achievement than income, education level or cultural background.

Math all around us

What we learn in the classroom can be extended at home. Math curriculum include the following:

Counting, patterning, recognizing numbers, classifying, comparing, recognizing shapes and more.You can help your child by extending learning at home through intentional interaction with your children during daily routines at home. (e.g., making a grocery list)

Worth quoting

Reading aloud to children has been called the single most important activity for building the knowledge required for success in reading.

Becoming a Reader...

It involves the development of important skills, including learning to:

use language in conversation

listen and respond to stories

learn and use new words

understand what is read

listen to the sounds of spoken language

Some tips for families:

Count everything, touch the objects as you say the corresponding number

--Ask children to help set the table, distributing the same number of each object to each plate, or ask them to tell how many more they need of something to have a particular number. Play games with 5 objects and 10 objects or more. Identify patterns everywhere: clothing stripes, colors and shape.

APPENDIX J

Take-Home Math Literacy Bag Written Instructions.

Dear Family:

Your child is bringing home the Take-Home Math Literacy Bag today, Please, read the book in the bag to your child. Included in the bag is an activity card to be completed with your child, a family journal to document your experience with the activity, make comments or suggestions, and a vocabulary card to use at home to increase your child's vocabulary skills.

FRIENDLY REMINDER:

- Return all the contents of the Math Literacy Bag in the same condition that you received them.
- Keep the bag and all contents safe from younger siblings and pets. There is a list of contents on the back of the bag. Check the list to make sure everything is in the bag when returned.

Thank you for your cooperation and have a wonderful bonding experience with your child.

Researcher

Carmen Espinosa

APPENDIX J

Instrucciones Escritas de las Maletas de Matemáticas.

Queridas Familias:

Su hijo/a trajo casa la Maleta de Matemáticas hoy. Por favor lea el libro que viene en el paquete de matematicas. Incluido en el paquete hay una tarjeta con actividades para que usted o un miembro de su familia lo complete con el nino/a, un diario familiar para que documente su experiencia, comentarios y sugerencias que pueda tener y una tarjeta con vocabulario para usar en casa e incrementar el vocabulario de su hijo/

RECORDATORIO :

- Devolver todo el contenido de este paquete de matematicas en buenas condiciones como las recibió.
- Mantener el paquete de matematicas y todo su contenido seguro de algun daño por hermanos menores o sus mascotas. Hay una lista con el contenido del paquete, por favor chequee que todo su contenido sea devuelto.

Gracias por su colaboracion y que tenga una experiencia maravillosa con su niño/a.

La Investigadora

.

APPENDIX K

Family Post-Survey

1.Did your method of reading to your child change after using the take-home math literacy bags?

2.How regularly did you engage with your child in mathematical activities using the take-home math literacy bags?

Once a week___ Twice a week__ Weekend___ Other_____

3.How did you and your children felt about the activities?

4.Did you feel that the materials provided in the take-home math literacy bags aided your child's understanding of the book?

5.What kind of workshops would you like to see in the future concerning math literacy?

APPENDIX K

Encuesta Familiar Final

1.Los metodos que usted usaba para leerle a su hijo/a cambiaron despues de usar las bolsas de literatura de matematicas?

2.Que tan seguido se involucró usted con su hijo/a en actividades de matematicas con las bolsas de literatura matematica que se enviaron a casa?

Once a week___ Twice a week__ Weekend___ Other_____

3.Como se sintieron usted y su hijo con las actividades de matematicas?

4.Sintió usted que los materiales que se enviaron en las bolsas de literatura matematica le ayudaron a su hijo a entender el libro?

5.Que clase de seminarios o talleres le gustaria que se conducieran en el futuro relacionados con matematicas?

APPENDIX L

Researcher Visits to the Classroom

Date: Week 1 Week 2 Week3 Week 4

Classroom 1 (4 and 5-year-old class)	Monday	Wednesday	Observations
Classroom 2 (3-year-old class)	Tuesday	Thursday	Observations

Comments:

APPENDIX M

Workshop Agenda

1.Introduction of researcher

2.Completion of Pre-Survey

3.How and why is important to help your child develop mathematical skills

- The benefits of parental involvement
- Strategies to improve mathematical skills in young children
- Discussion of ways parents can create a rich math environment at home.
- Reading with your child: where, when and how
- Giving child opportunities to hold the book and turn pages, manipulate materials.
- Asking questions about the story in the book
- How to expand their children's experiences though a variety of questioning techniques (e.g., who, what, when, where, why, how; additional details; how do you know? What would happen if?

4.Take-Home Math Literacy Bags

- Introduction to the Take-Home Math Literacy Bags
- Review activities for each book
- Return dates

5.Weekly Book Borrowing

- Take books home Thursday-return Tuesday
- Repeat book reading as many times as you/your child want and have time for.
- Do activities more than one time or in a different way.
- Review vocabulary words

Questions????

APPENDIX M

Agenda del Seminario

1.Introduccion de la Investigadora

2.Completar la Pre-Encuesta

3. Cómo y porqué es importante ayudarle a su niño a desarrollar sus habilidades matemáticas.

- Los beneficios de envolverse en la educación de sus niños
- Estrategias para ayudarle a su hijo a desarrollar habilidades matemática.
- Hablar hacerca de como crear un ambiente rico en matematicas en la casa.
- Leer libros a su hijo/a: Cómo, cuando y como.
- Darle oportunidades a su hijo para que aprenda a manipular un libro, pasar las paginas y manipular los materiales de una manera apropiada..
- Hacer preguntas hacerca de la historia del cuento
- Cómo expander la experiencia de lectura por medio de una técnica de hacer preguntas (ejemplo: quién, qué, cuando, donde, porqué, y cómo; Cómo sabes?

4.Paquetes de Matemáticas para la Casa

- Introducción para los paquetes de Matemáticas para llevar a casa
- Revisar las actividades para cada libro
- Fechas de devolución de los paquetes de matematicas

5.Horario de Entrega y Devolución de las Maletas de Matemáticas

- Llevarse las maletas los Jueves y devolverlos el Martes de cada semana
- Repetir la lectura y las actividades las veces que desee.
- Repasar el vocabulario de palabras

Responder preguntas????

APPENDIX N

Teacher Notes

Center Time Notes Date:_____

Materials worked with:
Observations/Anecdotes:
Quotes:

APPENDIX O

Teacher Interview

1. Did you notice increased visits to the math center after the "Take Home Math Literacy Bags" program began? Please elaborate.

A) Yes.

B) No.

C) Some.

2. Did you observe an increment in math related play? Please explain.

A) Yes.

B) No

C) Some

3. What types of math play did you observe?

_____

_____

4. What type of school materials did the children use?

_____

_____

References

Aud, S., Fox, M., and Kewal Ramani, A. (2010). *Status and trends in the education of racial and ethnic groups* (NCES 2010-015). US Department of Education, National Center for Education Statistics. Washington, DC: US Government Printing Office.

Anderson, A. (1997). Families and mathematics: A study of parent-child interactions. *Journal for Research in Mathematics Education, 28*(4), 484.

Anderson, A., Anderson, J., & Gear, A. (2015). Family literacy programs as intersubjective spaces: Insights from three decades of working in culturally, linguistically and socially diverse communities. *Language and Literacy, 17*(2), 41-58. doi: 10.20360/G2N30D

Dobbs-Oates, J., & Robinson, C. (2012). Preschoolers' mathematics skills and behavior: Analysis of a national sample. *School Psychology Review, 41*(4), 371-386.

Durand, T. M., & Perez, N. A. (2013). Continuity and variability in the parental involvement and advocacy beliefs of Latino families of young children: Finding the potential for a collective voice. *School Community Journal, 23*(1), 49-79.

Epstein, J. L., Sanders, M. G., Simon, B. S., Salinas, K. C., Jansorn, N. R., & Van Voorhis, F. L. (2002). *School, family and community partnerships: Your handbook for action* (2nd ed.). Boulder, CO: Westview Press.

Goodwin, L. W., & Goodwin, D. L. (1996). *Understanding quantitative and qualitative research in early childhood education.* New York, NY: Teachers College Press.

Gunderson, E.A., Ramirez, G., Levine, S.C., & Beilock, S. L. (2012). The role of parents and teachers in the development of gender-related math attitudes. *Sex Roles, 66(3-4),* 153-166. doi:http://dx.doi.org.ezproxy.wpunj.edu/10.1007/s11199-011-9996-2.

Hindman, A. H., & Morrison, F. J. (2012). Differential contributions of three parenting dimensions to preschool literacy and social skills in a middle-income sample. *Merrill - Palmer Quarterly*, *58*(2), 191-223.

Johnston, E. (2010) *Preschool mathematics: An examination of one program's alignment with recommendations from NAEYC and NCTM*. (Order No. 3451985). Available from Education Database (863490730).

Kocyigit, S. (2015). Family involvement in preschool education: Rationales, problems and solutions for the participants. *Kuram Ve Uygulanmada Egitim Bilimieri, 15*(1), 141-157.

Lewis Presser, A., Clements, M., Ginsburg, H., & Ertle, B. (2015). Big math for little kids: The effectiveness of a Preschool and Kindergarten mathematics curriculum. *Early Education and Development*, 26(3), 399-426.

Lilles, E. (2011). *High-risk Latino youth make gains toward closing the achievement gap* (Order No. 3482000). Available from ProQuest Dissertations and Theses Global. (908597404).

Lopez, E. M., Gallore, R., Garnier, H., & Reese, L. (2007). Preschool antecedents of mathematics achievement of Latinos: The influence of family resources, early literacy experiences, and Preschool attendance. *Hispanic Journal Of Behavioral Sciences*, 29(4), 456-471.

Murphey, D., Guzman, L., & Torres, A. (2014). *America's Hispanic children: Gaining ground, looking forward.* Child Trend Hispanic Institute. Retrieved from http://www.childtrends.org/wp-content/uploads/2014/09/2014-38AmericaHispanicChildren.pdf

Nievar, A. M., Jacobson, A. L., Chen, Q., & Dier, S. (2011). Impact of HIPPY on home learning environments of Latino families. *Early Childhood Research Quarterly*, 26(3), 268-277.

O'Donnell, J., & Kirkner, S. L. (2014). The impact of a collaborative family involvement program on Latino families and children's educational performance. *School Community Journal, 24*(1), 211-234.

Santiago, D. A., Calderón E. G., & Taylor, M. (2015). *The condition of Latinos in education.* Excelencia in Education. Retrieved from http://www.edexcelencia.org/research/2015- Factbook.pdf

Subramaniam, L. (2011) *Barriers to and facilitators of Latino parent involvement: One Georgia district's perspective*. Electronic Theses & Dissertations. 390. Retrieved from https://digitalcommons.georgiasouthern.edu/etd/390.

Starkey, P., Klein, A., DeFlorio, L., & Society for Research on Educational Effectiveness, (2013). *Changing the developmental trajectory in early math through a two-year preschool math intervention*. ERIC ED535663 non journal.

Varol, F., & Farran, D. C. (2006). Early mathematical growth: How to support young children's mathematical development. *Early Childhood Education Journal, 33*(6), 381-387.

Wessels, S., & Trainin, G. (2014) Bringing literacy home: Latino families supporting children's literacy learning. *Young Children, 69*(3), 40-46.