PURPOSEFUL SCHOOL-TO-HOME COMMUNICATION:

IMPACT OF INSTRUCTIONAL NEWSLETTERS ON THE SELF-EFFICACY

OF LOW-SOCIOECONOMIC STATUS PARENTS TO SUPPORT

MATHEMATICS LEARNING AT HOME

by
Maxie Hollingsworth

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Chair of Committee: Dr. Laveria F. Hutchison

Committee Member: Dr. Cameron White

Committee Member: Dr. Leah McAlister-Shields

Committee Member: Dr. Stephen Winton

University of Houston

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Abstract

Background: Parent education is an underutilized strategy which can help mitigate persistent opportunity barriers to mathematics achievement for students of color from low-income households. Parent engagement in the form of parent education and communication—an approach endorsed by *The Every Student Succeeds Act of 2015* which mandates that Title I schools provide materials and trainings to help parents work with children to improve student achievement−can help educators meet state education accountability standards and achieve the learning goals established by the National Council of Teachers of Mathematics. **Purpose:** This study evaluated the impact of a parent engagement newsletter as an educative resource to increase parent-self efficacy and boost informal mathematics learning practices in households identified as minority and low-income. The study addressed the following questions: 1. How does the parent education mathematics newsletter as a form of school-to-home communication impact engagement in informal mathematics learning for parents of low-SES, minority elementary school students? 2. What impact does the use of an educative mathematics newsletter have on the perceived self-efficacy of parents of low-SES, minority students to facilitate informal mathematics learning with their elementary school children? **Method:** This study employed a sequential mixed-methods approach to collect and analyze quantitative and qualitative data regarding primary caregivers' self-efficacy to support mathematics learning at home, attitudes about learning, and any impact on the adoption of academic parenting practices as a result of engaging with monthly parent education newsletters. Participants were selected via a convenience sample of adult caregivers who responded to a pre-survey and whose children attend the Title I elementary school. The

quantitative pre-survey collected respondents' self-reported behaviors, habits and attitudes regarding learning and mathematics. A nested sample of participants determined from pre-survey responses informed the selection of focus group interview participants. Participants completed two quantitative surveys following the administration of six researcher-created parent education newsletters. The newsletters provided research, age-appropriate activities, math-themed books, household items, and resources related to child development, parenting, cognition, mindset, and mathematics to support informal at-home mathematical learning experiences. Focus group interviews were conducted in English and Spanish to learn about the potential impact of the parent education mathematics newsletter. The study used inferential and descriptive statistics to determine statistical significance between study themes of self-efficacy, behaviors, attitudes and perceptions. A frequency analysis of the newsletter survey found high respondent satisfaction with the content and relevance of the information presented in the parent education newsletter. The following themes emerged from the focus group discussion which was recorded, transcribed, coded manually and using NVivo: Mathematics Perceptions and Attitudes, Intelligence Perceptions and Attitudes, Mathematical Learning Behaviors, Learning Attitudes, Parent Education, Home-School Alignment, Technology Ambivalence, and Newsletter Feedback. **Results:** Study results show that the parent education newsletter boosted parent self-efficacy to support mathematics learning at home. This study will add to the literature on parental engagement in mathematics learning, parental self-efficacy and mathematics achievement, virtual learning, parent education and communication, and mathematics achievement in low-SES, minority households. **Conclusion:** Study outcomes are consistent with the literature review and

demonstrate that parent engagement in the form of parent education can support equitable school-to-home alignment by providing practical tools and information to increase family engagement in mathematics learning. Ambivalence towards technology and online learning is a particularly relevant study outcome as parents support virtual learning at home during the Coronavirus pandemic. Study limitations include the small sample size and respondents' introspective ability of self-reported measures.

Researcher's Note

As a woman of color, I am acutely aware of the importance of the language we use to identify ourselves. As a member of two historically marginalized groups I am sensitive to the impact of labels, particularly as they relate to disparities in power and privilege. This study involves subject matter that is both personal and professional to me. I am a mother of two brown girls; and, I am an educator of an ethnically, racially and socio-economically diverse student body that is primarily Black, Latino and low-income. Terminology to describe race, ethnicity and culture can lack nuance and is often constructed to dehumanize. In this study, I will often use the term "minority" in a statistically relevant manner to refer to the Black, Latino or Native American communities which are the subjects of the research. Use of the term "minority" is intended to identify the racial, ethnic and cultural status of the study population as members of the overall population of the United States.

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Chapter 1

Introduction

As far back as the Middle Kingdom in Egypt, people have viewed education as a means of surmounting socioeconomic barriers (Drummond & Stipek, 2004; Khalil, Moustafa, Moftah, & Karim, 2017; Zinn, 2013). Parents of all social and economic classes have sought to educate their children through formal schooling, apprenticeships or home-training (Hepworth Berger, 1991; Shuman, 2017). Hoghughi and Long (2004) note various ways throughout history that parents and caregivers have sought and received advice on child-rearing and education.

Depending on a family's income and social standing, children were expected to help the family survive as soon as they were physically able to attend to age-appropriate tasks (Shuman, 2017). The focus on survival often meant that formal education was inconsistent as the family provided the primary means of schooling which largely focused on the development of practical skills, faith values, morality and proper behavior (Hiatt, 1984). To that end, child-rearing was a communal effort with parents seeking advice and counsel from extended family and other parents, from church elders and doctrine, or even from physician's advice manuals (Grant, 1998; Koepke & Williams, 1989; Whiting, 1974).

Societal shifts from agrarian to industrial altered family life, particularly for children who were recruited to labor in dangerous, unhealthy environments (Seaver, 1980; Shuman, 2017). Indeed, prevailing sentiments of the 19th century which considered "the dignity of labor" to be a religious duty reinforced the orientation of young children towards work (Hill, 1964 as cited in Seaver, 1980, p. 36). Scientific

discoveries and technological advances brought along crowded urban centers, deadly infectious diseases and exploitative work for children and the uneducated classes (Shuman, 2017). However, many Americans believed that an educated citizenry was critical to sustain democracy, and that working children were uneducated children who would not break out of poverty (Shuman, 2017). Accordingly, formal education of children came to be viewed as a social issue (Hindman, 2003). The development of government-sponsored parent education programs in the early 1900s ushered in a focus on child development and acculturating lower-class immigrant families to dominant American culture (Campbell & Palm, 2004; Hepworth Berger, 1991). As a result, education came to be considered a critical part of a child's development, as well as a benefit to society (Knight Abowitz & Stitzlein, 2018; Vila, 2000).

Concurrently, distinct and informal community-based support groups evolved over time to help parents address a plethora of familial and societal needs, including moral and religious instruction, child behavior and discipline, the management of communicable diseases, and children's social and intellectual development (Croake & Glover, 1977; Polivanova, Vopilova, & Nisskaya, 2016). Today, parents are viewed as their child's first and most important teacher, and parent engagement in education is codified into federal law. While parent education programs have significantly altered the relationship between parents and the formal school environment; the importance of parents as their child's first and most important teacher has remained constant. The role of parents in their child's education continues to change as awareness of parenting practices which support academic success increases.

I began teaching in a large, public urban school district several years ago. Parent outreach efforts at my elementary school campus largely followed a basic template−an open house at the beginning of the school year where students and families meet the teacher and administrators; parents access an online portal to view their child's assignments and grades; the school sends various papers home with students in a weekly communication folder; teachers communicate electronically with parents regarding behavior and academic issues through email, text or other mobile message platform; and, the school hosts a family math or family literacy event at some point in the school year.

As a second-grade teacher, I found that many of my students struggled with foundational mathematical skills such how to represent numbers and relationships between numbers. Students developed negative attitudes towards mathematics and parents unfamiliar with mathematical procedures expressed confusion with how to help their children with homework. I began to explore interventions to boost my students' understanding and comfort-level with mathematical content, including research on the use of mathematics-themed children's literature to promote real-world connections to mathematical concepts. The literature revealed that students demonstrate greater critical-thinking and problem-solving skills when they receive mathematics instruction which incorporates children's literature (Furner, 2018). I began to actively seek out children's literature with mathematical themes and to design my instruction to help my students build number sense and analytical skills for long-term success. As part of my practice, I sent home a weekly bulletin to parents and caregivers which outlined the learning objectives and homework for each subject, specific books which students were expected to read, and tips for supporting learning at home. I found that the weekly bulletins and

children's literature provided an accessible point of entry to mathematical thinking on which students and their families could build. As I transitioned from second-grade teacher of 27 students to the ancillary mathematics lab specialist for all 660 students in the school, I sought additional ways to strengthen mathematics learning across campus. In my new position, I included mathematical brainteasers, logic puzzles, and curated a mathematics-themed library to support learning for pre-kindergarten through fifth grade students. I also wished to maintain communication with parents and caregivers regarding the new ways that students would receive weekly mathematics instruction in the lab and to offer suggestions to support mathematics learning in the home. A monthly newsletter developed from this need to improve student outcomes and to boost parent engagement in mathematics learning.

The National Council of Teachers of Mathematics (NCTM) established six principles regarding mathematical teaching and learning for pre-Kindergarten through twelfth grade students (NCTM, 2000). These research-based guidelines help educators and policymakers understand content, best practices and pedagogy as they relate to mathematics education. The NCTM's principle of learning states that students "must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge" (NCTM, 2000, para. 2). Children carry the experiences and knowledge gained from the informal learning environment of the home into the formal learning environment of school. These foundational experiences help shape how readily and efficiently a child transitions into the academic environment (Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Diezmann & Yelland, 2000; Doig, McRae, & Rowe, 2003; Galindo & Sonnenschein, 2015; Manfra, Squires, Dinehart, Bleiker, Hartman, &

Winsler, 2017). Due to structural opportunity barriers (Carter, 2016; Carter & Welner, 2013; Simms, McDaniel, Fyffe, & Lowenstein, 2015; Johnson & Howard, 2008; Thompson, 2010), minority students from low socio-economic backgrounds are less likely to enter school with the schemata–the cultural capital and fundamental pre-mathematics and pre-literacy skills needed for academic achievement (García & Weiss, 2017; Goldhaber, Lavery, & Theobald, 2014); and they lack equitable access to critical educational resources which support academic success (Dreeben & Gamoran, 1986). As a result, teachers often struggle to help students from low-income backgrounds meet state education accountability standards, let alone gain the experiential skills and knowledge outlined by the NCTM.

The labor market has shifted from needing physical labor to requiring stronger technical, communication and analytical skills from workers (Bureau of Labor Statistics, 2019; Carnevale, Smith, & Strohl, 2013). This strong need for mathematical knowledge in the workforce has direct implications for teachers of underrepresented students from families of lower socio-economic means.

Data from the 2019 State of Texas Assessments of Academic Readiness (STAAR) underscore the pressure for schools, particularly in urban districts, to improve mathematics achievement for these students. So-called racial and ethnic achievement gaps are narrowing in Houston's largest school district with decreases from one to four percentage points in all STAAR-tested subjects between Black and Anglo students, and by five percentage points between Hispanic and Anglo students in writing (HISD Research & Accountability, 2019). However, disparities in academic performance for

students from low-income households remain steady at a gap of 13-percentage points (HISD Research & Accountability, 2019).

Parents of all socioeconomic levels struggle to adequately support mathematics learning at home because of a lack of understanding of mathematical content and instruction (Díez-Palomar, Ortín, & Roldán, 2012; Jacobbe, Ross, & Hensberry, 2012; Mohr-Schroeder, Jackson, Cavalcanti, Jong, Schroeder, & Speler, 2017), or a lack of self-efficacy (Bartley & Ingram, 2017; Eccles & Harold, 1996; Hoover-Dempsey & Sandler, 1997; Shumow and Lomax, 2002). Parents with fewer resources and limited cultural capital are thought to experience these factors more acutely (Bourdieu, 1977, 1986; DiMaggio, 1982; Lareau, 1987; Roscigno, Tomaskovic-Devey & Crowley, 2006; Shumow & Lomax, 2002; Teachman, 1987). Parental engagement strategies which expose caregivers to concrete examples of instructional activities can increase their knowledge base and comfort level with academic content; reduce apprehension related to their ability to support their children's education (Berkowitz, Schaeffer, Maloney, Peterson, Gregor, Levine & Beilock, 2015; Kliman, 2006); and stimulate positive school outcomes (Ames, 1993; Ames, de Stefano, Watkins, & Sheldon, 1995; Albritton, Klotz & Roberson, 2003; Boaler, 2013; Epstein, 1995; Griffin & Steen, 2010; Howard & Reynolds, 2008).

Many schools which typically serve students from low socioeconomic status (SES) households are exploring how targeted parental engagement in the form of education and communication can improve their academic outcomes. Public school educators will find federal endorsement for this approach in the 2015 *Every Student Succeeds Act* (ESSA), a reauthorization and revision of the 1965 *Elementary and*

Secondary Education Act (ESEA) and replacement of *No Child Left Behind* (NCLB), which mandates that Title I schools "provide materials and trainings to help parents work with children to improve student achievement" (Every Student Succeeds Act, Title I, Public Law 114-95 § 1116, 2015, p. 78). Howard and Reynolds (2008) note that parents from historically marginalized communities can potentially benefit from this legislation's focus on family engagement and empowerment. Consistent school-to-home communication regarding mathematics learning in particular can explicitly illuminate these practices for parents and families (Kliman, 1999).

If schools are to execute the NCTM's principles of learning, then mathematics interventions should address knowledge gaps for both students and parents, and foster opportunities for parents to facilitate learning experiences which dovetail with formal mathematics learning (Kliman, 1999, 2006; Lopez & Caspe, 2014).

Problem of Practice

The study site is a Title I public elementary STEM (Science, Technology, Engineering and Math) school in a large urban school district which serves 650 pre-kindergarten through fifth grade students (see Table 1). The school receives a Title I designation and funding because at least 40 percent of enrolled students are from low-income households (U.S. Department of Education, 2018). The racial / ethnic demographics of the school are 24 percent African American, 56 percent Hispanic, 14 percent Anglo, one percent Native American, four percent Asian/Pacific Islander, and one percent identified as biracial or multi-ethnic. The school is located in a middle-class community with 55% of the students identified as economically disadvantaged. English-language learners comprise 27% of the student population and 9% of the students receive

Special Education services. Every student attends a weekly 45-minute ancillary mathematics lab facilitated by this researcher.

Table 1

Student Demographics School Study Site and School District

Race / Ethnicity	School	District
Asian American / Pacific Islander	4%	4%
Black / African American	24%	24%
Hispanic / Latino	56%	61%
Multi-racial / Multi-ethnic	1%	1%
Native American	1%	1%
White / Anglo	14%	8%
English Learners	27%	48%
Economically Disadvantaged	55%	75%

Data from 2017, 2018 and 2019 district-level mathematics assessments demonstrate that students at the campus have difficulty working with numbers flexibly. Students from the two lowest-performing classes in the second and third grades, which were comprised largely of students from at-risk sub-populations (i.e. Black and Hispanic students from low SES households, and English-language learners), did not demonstrate adequate progress towards meeting mathematics achievement benchmarks over the course of the previous academic year. Overall, third and fourth grade students failed to demonstrate working knowledge of the most basic mathematics skills, including number sense (numeracy) and understanding of the commutative, associative and distributive properties of mathematics. The campus surpassed performance indices on state formative assessments for closing achievement gaps; yet, 21 percent of current fourth grade

students at the study site performed at “Did Not Meet” or “Approaches” levels on the third grade STAAR, and 19 percent of current fifth grade students performed at “Did Not Meet” or “Approaches” levels on the fourth grade STAAR. Additionally, I observe disparities in mathematical and language skills between students from lower- and middle-SES households at the school. Despite various mathematics interventions to accelerate their learning, benchmark data demonstrate that students who struggle with basic numeracy and advanced mathematical skills are not performing at academic levels which meet State of Texas accountability standards; nor are they constructing new knowledge through school-based learning (NCTM, 2000).

Parents and caregivers support the school at various times as classroom and teacher workroom helpers, as chaperones for field experiences, and by organizing and staffing fundraising events throughout the schoolyear. Parent engagement in school-sponsored academic events is low, however. By way of example, the school hosted a Parent University event which offered informational sessions led by teachers and school district staff on Supporting Math at Home, Internet and Digital Safety, Art, Writing, Science, and Communication. Only 37 parents attended Parent University according to event sign-in sheets. The school holds an annual carnival-themed Family Math Night with food, prizes and giftbags for each student. Family Math Night highlights math games, brainteasers, teacher-led and student-led math-themed activities, and an *Are You Smarter Than a Fifth Grader?* competition. Sign-in sheets from 2018 show that 87 of the 590 enrolled students attended the event, and 127 of the 660 enrolled students attended the event in 2017.

Parents at this campus could benefit from increased knowledge of mathematical content and practices which reinforce student engagement and mathematical skills. They recognize the importance of assisting their children at home but need a fuller understanding of suitable activities to carry out and awareness of the mathematical stages of development. A number of parents have vocalized concerns about their ability to understand the mathematics curriculum and to help students with mathematics homework during various exchanges with me throughout the year. Parents who attended the *Parent University Supporting Math at Home* sessions expressed anxiety about their aptitude for supporting their children's learning. Notably, each of these parents held post-secondary education degrees and were from middle-class households. At summer school promotion conferences, parents of students at risk of failing also shared unease about their capacity to help boost their children's achievement in mathematics. Additional insight will enable all of these parents to feel more competent to engage in mathematics learning practices at home. Therefore, an education resource is needed to help parents and caregivers implement new parenting practices and expand their skill set.

Purpose of the Study

This study examined the impact of parental education through a school-to-home communication newsletter as a strategy to increase parental self-efficacy and parental engagement in informal mathematical learning practices in households identified as minority and low-SES. This study seeks to address the need for more dynamic parent involvement. A monthly mathematics newsletter designed to fill the knowledge and experiential gaps for parents will provide research, anecdotal and field information, tips, tools, activities and resources related to child development, parenting, cognition, mindset,

and mathematics which parents can use to facilitate informal mathematical learning experiences outside of the formal school setting. Shaping these basic mathematical literacy skills are mathematics-themed children's books, common toys and games, and household items which can be used as learning tools.

The following theoretical perspectives will guide this study's approach to intervention: Epstein's (1990, 1995, 2001) seminal typology of family involvement which suggests that learning at home involves "interactive activities that students share with others at home …, linking schoolwork to real life" (Epstein, et al., 2002, p. 181); Vygotsky's (1987) sociocultural theory which proposes that learning is an inherently social process and that interaction is a fundamental part of cognitive development (Mahn, 1999; Schunk, 2012); and Bandura's (1993) social cognitive theory which highlights the key role that self-efficacy plays in impacting an individual's belief in their capacity to successfully exercise control over themselves and life events in order to accomplish specific goals or tasks.

The intervention is a parent education newsletter which is designed to address the ideas of learning as an interactive and social process through which individuals construct meaning, students making connections between schoolwork and real life, individuals constructing meaning through learning experiences, and impacting self-efficacy and attitudes about learning. I take the view that intelligence is malleable; that effort is a fundamental part of learning; and that learning occurs with appropriate experiences. Using this frame of reference, this study's intervention seeks to communicate relevant information to parents and caregivers regarding developmental mathematical learning, child development, and parenting practices which support the inherent trial and error

process of mathematical learning. One goal of this approach is to promote what Carol Dweck (2008) identifies as a "growth mindset" to impact parent attitudes related to learning which boost and maintain at-home learning practices. In doing so, this study's intervention tool will create a "home-school alignment" (Lehrer & Shumow, 1997), enabling parents to reconstruct mathematical knowledge for themselves and their children through informal mathematics learning experiences; and, thus causing a shift in mindset and approaches to engagement in mathematical learning and in ways of communicating about learning in general.

Research Design

This study employed a mixed-methods approach to guide the collection and analysis of quantitative and qualitative data regarding parents' and primary caregivers' perceptions of their self-efficacy to support math learning at home, and any impact on the frequency and extent of mathematical-related activities and general educational parenting practices.

The following research questions are intended to provide answers to the issue posed in the statement of the problem:

1. How does the parent education mathematics newsletter as a form of school-to-home communication impact engagement in informal mathematics learning for parents of low-SES, minority elementary school students?
2. What impact does the use of an educative mathematics newsletter have on the self-efficacy of parents of low-SES, minority students to facilitate informal mathematics learning with their elementary schoolchildren?

The newsletter intervention focuses on activities and readily accessible materials which parents can utilize to promote skills that build vertically from pre-kindergarten to fifth grade. The newsletter content will serve as the intervention with the goal of helping parents enhance their self-efficacy to support students' cognitive mathematical skills. The monthly parent education newsletter will utilize the following format to address these goals: a) general message related to a monthly mathematical or cognitive learning theme; b) unique calendar days, facts and trivia related to mathematics; c) recommended math-themed books for elementary school children, d) mathematics activities designed for prekindergarten to fifth grade elementary students; e) a list of common household items, toys and games which support mathematical learning; f) an inspirational mathematics-related quote; g) a mathematics joke or brainteaser; h) a summary of research findings on children's cognitive and socio-emotional development and helpful parenting tips; i) directions and supply list for at-home mathematics learning activities for early childhood, lower elementary and upper elementary grades; j) recommended online mathematics resources.

Definitions

Attitudes. Lasting patterns of evaluations which people make about objects, ideas, events, or other people. Attitudes can be positive or negative, conscious or unconscious, and guide a person's behavior and decisions (Bohner & Dickel, 2011).

Behaviors. The way in which a person acts or functions in response to a situation, person or stimulus (Cambridge Dictionary, 2020).

Parent Engagement/Parent Involvement. Occurs when parents and school staff work cooperatively to support and improve the learning, development, and health of

children across multiple settings, including school, home, and other places in the community (Centers for Disease Control, 2015).

Perceptions. Refers to the way information about objects, relationships, and events is consciously experienced, interpreted and organized by the senses and turned into meaningful knowledge.

Cultural Capital. The mindset, culture, symbols of status, preferences and activities that can be strategically used as assets across a lifetime of social interactions

Low-income. Families and children are defined as low-income if the family income is less than twice the federal poverty threshold. The federal poverty threshold for a family of four with two children is $25,100 in 2018 (National Center for Children in Poverty, 2016; U.S. Department of Health & Human Services, 2018).

Low Achievement. The difference between what a student has learned and what the student was expected to learn at a certain point in his or her education, such as a particular age or grade level (The Glossary of Education Reform by Great Schools Partnership, 2018).

Academic Achievement. Any significant and persistent disparity in academic performance or educational attainment between different groups of students such as students from higher-income and lower-income households (The Glossary of Education Reform by Great Schools Partnership, 2018).

Equity. The fairness and impartiality of the process.

Title I. Title I of the Elementary and Secondary Education Act provides financial assistance to local educational agencies and schools with high numbers or high percentages of children from low-income families to help ensure that all children meet

state academic standards (U.S. Department of Education, 2018).

Schema. Units of background knowledge on a particular topic.

Self-efficacy. The belief in one's capabilities to organize and execute the courses of action required to manage potential situations" (Bandura, 1995, p. 2).

Minority. Social groups whose members experience a narrowing of opportunities that is disproportionately low compared to their numbers in society and to members of a dominant or majority group because of physical, cultural or other perceived characteristics (Randall, 1995)

Socioeconomic Status. A measure of the combined economic level and social standing or class of an individual or a group.

Numeracy. The ability to understand and manipulate numbers. Also known as number sense and mathematical literacy.

Mindset. An individual's established set of attitudes and beliefs.

Out-of-School Time. Any timeframe when school is not in session.

Sociocultural. The impact of social and cultural factors on an individual's experience.

Significance of the Study

Studies show that gaps in education develop for low-income minority students before they enter school; yet, parents are often unaware of these gaps. Children's cognitive skills and attitudes play an important role in their academic achievement. Students who struggle academically demonstrate a range of negative responses to the content they encounter the most – math and reading. These negative attitudes include ambivalence, resignation and anxiety (Keat & Wilburne, 2009), and compounding events

can erode students' confidence and outlook towards school, and, specifically, towards mathematics instruction. Deficits in students' prerequisite mathematics skills and pessimistic attitudes towards mathematics that develop during the early elementary school years contribute to long-term poor outcomes in mathematics achievement.

Longitudinal studies on school readiness and academic achievement show lifetime consequences for low numeracy, including higher rates of unemployment, lower rates of college enrollment, greater income disparities, poor psychological health, lower rates of home ownership, and stronger likelihood of incarceration (Bynner & Parsons, 2005). The Education Equality Index (2016) shows that the academic achievement gap in Houston grew by 15 percent between 2011 and 2014. The projected costs of failing to properly educate at-risk students are undeniable. At the local level, the city of Houston risks losing the economic base to employ students who are not prepared for careers that will sustain families and communities.

Based on the existing research about the benefits of parent education and informal learning at home, further and more extensive study will demonstrate positive outcomes. Further research in this area will uncover which factors contribute to increased parent engagement in mathematics learning, and the impact on social and cultural capital, if any. The home-school connection is important to this research because of the potential significant policy considerations. Given the anticipated changes to public education in the current political climate and the policy trajectory of the U.S. Secretary of Education, the literature will benefit from additional data.

This study's focus on parent engagement and education to improve academic outcomes supports positive relationships between schools and parents through

collaboration and clear communication about educator's top priorities, including family engagement and equitable access to education. This study attempts to address equity and access for low-income students through use of a parent-engagement tool designed to reinforce the school-to-home connection, and to boost parent self-efficacy related to supporting mathematical learning at home. Students benefit from well-informed caregivers; caregivers benefit from consistent and positive communication with teachers and school administrators regarding academic achievement.

Teachers and principals can reference and reinforce common messaging and practices such as those addressed through the communication and parent-engagement intervention utilized in this study to develop stronger and positive relationships with parents and caregivers. The type and content of the communication and support examined in this study could possibly serve as a replicable model for school-to-parent communication and equity-based outreach to strengthen relationships between schools and families, to support family engagement, and to boost the self-efficacy and capacity of parents and caregivers to support math learning.

Chapter 2

Literature Review

Parents and primary caregivers have long been recognized as a child's earliest and most consistent teachers from infancy into early adolescence. The potency of the parents' role cannot be overstated, for they determine to what, to which extent, and to whom a child will be exposed during these important early years. Foundational learning experiences have a significant impact on a child's later success in formal academic settings. Indeed, productive struggle and failure are fundamental to the learning process; and all children struggle as they acquire new information. Additionally, depending on one's mindset, struggle provides additional opportunity for learning. What happens when a child's academic struggle extends beyond productive and learning opportunities are stymied? Are there ways to support a student whose foundational learning does not support academic achievement? These questions are relevant for children of color from low SES households who often enter school with experiential gaps and less developed knowledge which hinder learning and achievement in school.

This study examines the effectiveness of parent engagement, specifically parent education through school-to-home communication, and informal learning at home as strategies to increase mathematical achievement for low-income, minority students. This review explores literature concerning a parent's effectiveness in supporting learning at home to increase academic achievement in mathematics. There is a brief look at how parent engagement is defined, as well as a brief examination of the school-to-home communication and its impact on academic achievement. The review also examines research on parental involvement as it relates to mathematics achievement for minority

students of low SES families; as well as connections between self-efficacy and parent education as a viable means of supporting elementary school students. The role of cultural capital on parent engagement is briefly considered. This literature review does not intend to offer an exhaustive synopsis of studies on the varying types of parental involvement. Nor will this review explore the symbiotic connections between schools and families; though it will highlight some pertinent aspects of school/teacher attitudes towards underprivileged families.

Constructing Knowledge

Research from the last four decades indicates that children intuitively begin to build number sense very early. Children balance themselves in physical space, identify patterns, estimate a group of objects without counting, and compare amounts (Seo & Ginsburg, 2004; Gelman & Gallistel, 1978; Baroody, Lai & Mix (2006). Additionally, they develop early understanding of sounds and structure of language through talking and singing; early recognition of print and its functions, and early development of language and vocabulary through dialogic reading and oral storytelling traditions (Whitehurst & Lonigan, 1998). These important interdisciplinary skills and practices help children make sense of their world and help them develop a solid foundation for academic success in mathematics (Nguyen et al, 2016).

Based on the foundational gaps that many low-income, minority students present in elementary school (Tamis-LeMonda et al, 2017), the literature suggests that math learning at home should focus on the fundamental aspects of learning: helping children construct, organize, internalize and apply meaningful learning experiences. Much of the literature focuses on early childhood math learning experiences in preschool settings, or

linkages between preschool math learning and socioeconomic status and race (Sieglar & Ramani, 2008; Ramani & Siegler, 2014). This study seeks to add to the body of literature related to math learning at home for low SES, minority students in elementary school.

Theories proposed by Piaget (1963) and Vygotsky (1978) on how children form thoughts and construct meaning through inquiry-based play reinforce the important role of the parent in helping develop a child's schema, and, therefore academic success. Steele (2001) believes that mathematics instruction find's its strength in Vygotsky's sociocultural theory, noting that "learning mathematics involves participation in certain established mathematics cultural practices" (p. 404). Vygotsky (1978) posits that cognition develops through an interplay of individual and social interactions where attentive focus and abstract ideas solidify into specific concepts, build meaning and shape perception. This can be extended to the parent education newsletter which serves as a scaffold for parents and establishes a mathematical culture of language and hands-on activities. This idea of mathematical culture aligns with Bandura's (1977a) theory of social cognitive theory of self-efficacy which values error as a fundamental aspect of the cognitive learning experience.

Informal mathematical experiences such as playing cards and board games or reading mathematics-themed children's literature can help students access underlying connections to the content (schema) in a meaningful way (Sieglar & Ramani, 2008; Ramani & Siegler, 2014; Anderson, Anderson, & Shapiro, 2004). Additionally, these informal experiences reinforce the socialization skills needed for a successful transition to school (Lehrer & Shumow, 1997). Arcavi (2002) points to the need for learning experiences to "uncover situations that may seem nonmathematical", such as looking for

an address, "…but have the potential to serve as springboards to academic mathematics" (p. 14). As Lehrer and Shumow (1997) note, "knowledge of children's thinking may guide the manner in which adults intervene" (p. 44).

According to Zaretta Hammond (2015) "culturally and linguistically diverse" learners need more opportunities to construct knowledge and to "engage in what neuroscientists call productive struggle" (p. 12)−the fundamental mental strategies in which a learner engages within their zone of proximal development to work through a challenging concept or process. Hammond (2015) asserts that inequitable learning opportunities don't foster "intellective capacity building" (p. 59). Hammond suggests that a culturally responsive context validates a student's cognitive ability and supports their willingness to take learning risks. Parents possess "cognitive insight" (Hammond, 2015, p. 75) as architects of their children's learning, and are ideally suited for this task because they have an existing alliance and a culturally responsive rapport with the learner.

Neuroplasticity, Cognition and Mindset

Research on the brain demonstrates that learning occurs throughout an individual's lifetime (Voss et al, 2017). Some research suggests that early childhood provides a critical, but finite window for learning (Knudson, 2004); however other studies on neuroplasticity and mathematics learning (Iuculano et al, 2015) show that the brain adapts to new learning (Demarin & Morović, 2014; Greenough, Black & Wallace, 1987; Ramey, Yeates, & Short, 2004; Blackwell, Trzesniewski & Dweck, 2007) depending on the experience (Fox, Levitt, Nelson, 2010; Shonkoff & Phillips, 2000). The literature on neuroplasticity and mathematics largely focuses on students with

mathematical learning disabilities such as dyscalculia (Menon, 2016; Iuculano et al, 2016; Fuchs et al, 2010); yet the research offers promising results for students of average intelligence who could benefit from intentional experiential mathematical learning interventions beyond the preschool years (Ramey, Yeates, & Short, 2004). This concept of experience-dependent plasticity (Fox, Levitt, Nelson, 2010; Shonkoff & Phillips, 2000) applies practically to parents as a child's chief facilitator of learning experiences and schema. Patterns of achievement are not destiny according to this "malleable theory of intelligence" (Blackwell, Trzesniewski & Dweck, 2007, p. 258). It also suggests that schools can consistently expose parents to new information about how children learn best, thereby helping parents extend and enhance mathematics learning at home.

Much of the literature on mindset and mathematics focuses on students' mathematics-related anxiety or intergenerational mathematics-related anxiety and its impact on student motivation and achievement (Keat & Wilburne, 2009; Lee, 2009; Maloney et al, 2015). Children and parents carry their beliefs about intelligence and achievement into their learning experiences and these beliefs carry "real consequences for achievement" (Blackwell, Trzesniewski & Dweck, 2007, p. 258). Jeynes (2010) notes a consistent link between parents' education-related beliefs and expectations with positive academic outcomes. Blackwell, Trzesniewski and Dweck (2007) found that middle school students trained in incremental (growth) mindset demonstrated improvements in grades and motivation through focus on the potential to strengthen their own intellectual ability. These findings convey possible benefits for elementary school parents who receive information directly from the school about their capacity to bolster their children's achievement through consistent at-home mathematics learning activities.

Parental and Family Engagement

Much of the discourse on parental involvement attempts to explain the motivators and hindrances to parental engagement in education. While the literature covers varied perspectives on parental engagement, several themes arise in the literature, including impacts across racial/ethnic and socioeconomic levels; connections between parental involvement and achievement; the effects of parents setting rules and expectations regarding academic and extracurricular activities, and establishing academic and career goals; parent participation in school-related activities and committees; at-home learning, and links to social and cultural capital.

The literature describes and demonstrates acts of parental engagement in education in diverse ways and with diverse outcomes, though with no unifying definition. According to The Every Student Succeeds Act of 2015, parental involvement is "the participation of parents in regular, two-way, meaningful communication involving student academic learning and other school activities" (Title I, Public Law 114-95 § 1116). Gonzalez and Wolters (2006) define parental involvement as, "the extent to which a parent is dedicated to, takes an interest in, is knowledgeable about, and is actively participating in the child's life" (p. 204).

According to Henderson and Mapp (2002), parent involvement in education is crucial; providing overall boosts to attendance, grades, test scores, social skills and behavior – irrespective of household socioeconomic status. Hill and Craft (2003) observe that research has yet to pinpoint exactly how and why parental involvement increases academic achievement. Studies are needed to address gaps in the research related to

upper elementary grades, specific academic content areas, and analysis of specific and diverse parent engagement strategies.

On the whole, research provides an uneven view of the impacts of parental involvement. Li and Fischer (2017) show that parental involvement proves beneficial for economically disadvantaged Black and Latino students (Li & Fischer, 2017). According to Lee and Bowen (2006) parental engagement is "a major tool identified to reduce inequalities in achievement (which) may have limited ability to do so because of inequalities in the opportunities for and benefits of parent involvement across demographic groups" (p. 194).

Several studies show a link between parental involvement and positive academic outcomes (Starkey & Klein, 2000; Henderson & Mapp, 2002; D'Agostino et al., 2000; Epstein, 1990, 2010; Gonzalez & Jackson, 2013; Cooper, Crosnoe, Suizzo & Pituch, 2010; Jackson & Remillard, 2005), particularly for preschool and elementary school students (Hill & Taylor, 2004). Some studies (Sheldon & Epstein, 2006; Nokali, Bachman & Votruba-Drzal, 2010) positively link parental involvement and math achievement; while other studies show insufficient positive links (Fan & Chen, 2001) or even harmful impacts of parental involvement, especially when parents provided homework help in mathematics (Fan & Chen, 1999; Shumow & Miller, 2001).

The linkage between parent-child interactions, school readiness and educational success are undeniable; though Magnuson and Schindler (2016) note that there is some skepticism in the literature regarding the causal relationship between the quality of parent involvement and early learning. Harris and Goodall (2007) believe that inconsistent research conclusions regarding the connection between parent involvement and academic

achievement are a result of methodological weaknesses in some studies, and wide-ranging definitions of the issue itself.

Several scholars (Graves Smith, 2006; Gonzalez & Jackson, 2013, deCarvalho, 2000; Johnson, 2010; Manz et al., 2004; Beltrán, 2012, Milner, 2012; Epstein, 1995; Lareau, 1987) note that assumptions related to parental involvement favor middle- and upper middle-class families, leaving the onus of involvement resting largely on low-income families. Jackson and Remillard (2005) state that parental involvement is often perceived "as activity that is visible to school officials and teachers" (p. 67) giving the false impression that parents of color from low SES households are uninvolved in their children's education. The literature reveals barriers which impact the traditional involvement of parents of lower SES households, including low confidence in their ability to interact with school staff, low embodied cultural capital due to a history of unsatisfactory academic achievement or formal education, lack of readily available childcare, linguistic isolation, and inflexible work schedules (Beltrán, 2012; Johnson, 2010; Sheldon, Epstein & Galindo, 2010; Jackson & Remillard, 2005; Barton et al., 2004; Manz et al., 2004; Epstein, 1995; Lareau, 1987, 2003).

The literature demonstrates that parental engagement in academics at home is correlated with improved academic achievement for low-income students of color (Li & Fischer, 2017; Epstein, 2006; Okpala, Okpala, & Smith, 2001; Clark, 1983). Some studies (Jeter-Twilley, Legum & Norton, 2007; DeFlorio & Beliakoff, 2015) suggest that parents of lower SES households have little to no involvement in their children's education and that deficits in the home environment contribute to low academic achievement. Other studies suggest that low SES parents serve as influential sources of

educational support for their children in spite of limited financial and educational resources (Jackson & Remillard, 2005; Okpala, Okpala & Smith, 2001; Clark, 1983). Jackson & Remillard (2005) point to the role of Black mothers as advocates and facilitators of setting high expectations and goals, fostering independence and self-reliance based on sociocultural realities. Jeynes (2011) proposes that schools nurture more subtle forms of parental involvement such as setting expectations, communication between parent and child, and parental style which is predominate in Black and Latino households of all socioeconomic levels.

At-Home Engagement

Broadly, the literature demonstrates that parental engagement in academics at home is correlated with improved academic achievement for low-income students of color (Li & Fischer, 2017; Epstein, 2006; Okpala, Okpala, & Smith, 2001; Clark, 1983). Much of the literature supports the connection between parent self-efficacy and engagement at home (Hoover-Dempsey, 2011; Hoover-Dempsey & Sandler, 1997; Coleman & Karraker, 1998; Wittkowski, Dowling & Smith, 2016; Lee & Bowen, 2006; Eccles & Harold, 1993; Ames et al., 1995; Lehrer and Shumow, 1997; Tazouti & Jarlégan, 2016; Wilder, 2017; Bandura, Barbaranelli, Caprara, & Pastorelli, 2001; Sanders, Epstein, & Connors-Tadros, 1999). The literature notes that schools strengthen parent engagement and relationships when they provide useful information on skills and activities which families can readily reinforce at home, often with long-term results (Epstein et al., 2004; Fantuzzo, McWayne, Perry, & Childs, 2004; Jeynes, 2011).

Fantuzzo et al., (2004) argue that at-home parent engagement is potentially more important than in-school parent engagement. The authors recommend that schools

conduct multiple assessments of parent involvement throughout the school year to gauge impact on educational outcomes, and to develop a plan to better support the school-to-home connection. Griffin & Steen (2010) suggest that school counselors have a unique opportunity to use their positions to help deepen parent knowledge of productive at-home learning activities, particularly during "typical guidance interventions" (p. 224).

Epstein et al., (2004) suggest that schools commit to increased learning at home involvement by sharing explicit ideas and suggestions which inform families about academic content and the specific foundational skills which students need to perform successfully in the classroom. Epstein et al., (2004) and Griffin and Steen (2010) point out that schools can support at-home parent involvement by teaching parents how to monitor and discuss academic progress at home, and how to establish a post-secondary college or work plan with their children.

Parent Education

Research on high-quality early childhood parent education programs such as Parents as Teachers and Head Start shows a connection to school readiness (Caspe, Lopez & Wolos, 2007; Zigler, Pfannenstiel, Seitz, 2008; Barnett & Hustedt, 2005; Epstein, 2010; Rawls, 2007; Jeynes, 2010; Ramani, Rowe, Eason, & Leech, 2013). The data is mixed on links between parent education and lasting achievement in early elementary school (Barnett & Hustedt, 2005; Brooks-Gunn & Markman, 2005); however, program quality and researcher bias regarding parenting differences for Black and Hispanic families may contribute to these differential outcomes. Much of the literature on parent education examines the impact of parenting classes on parental attitudes and parenting skills; as such, this study seeks to fill gaps in the literature related to parent education

through formal school-to-home communications such as newsletters to increase mathematics achievement.

Several studies noted that intensive parent education which included “common content knowledge” … (and) …“specialized content knowledge” (Knapp, Jefferson & Landers, 2013, p. 437) connected to classroom learning significantly improved parent attitudes towards mathematics learning (Cannon & Ginsburg, 2008; Eisenreich & Andreasen, 2015; Knapp, Jefferson & Landers, 2013). Much of the research on parent education and outreach highlights school-based family math events and informational meetings regarding broad topics such as curriculum and behavioral expectations (Epstein et al., 2002; Henderson & Mapp, 2002; Houtenville & Conway, 2007). There is little in the research regarding parent education efforts to support mathematical learning at home; however, Berkowitz et al (2015) found that parents who engaged their children in brief, computer-based mathematics activities at home demonstrated a reduction in mathematics-related anxiety, while the students showed gains in mathematics achievement. Ginsburg, Block, and McWayne (2010) contend that schools have a responsibility to support learning at home for students from low-income families.

Much of the literature suggests a need for greater alignment between school and home to improve academic outcomes for minority students (Epstein, 2010; Hoover-Dempsey & Sandler, 1995, 1997; Lehrer & Shumow, 1997; Wilder, 2017). Some studies extend the idea of alignment and propose that schools initiate parent education outreach (Gonzalez & Jackson, 2013; Knapp, Jefferson & Landers, 2013) with sensitivity to the cultural and socioeconomic norms and expectations that can often hinder involvement of lower-income families (Gonzalez & Jackson, 2013).

According to Ames et al., (1995) and Eccles and Harold (1993), parents develop stronger self-efficacy regarding their ability to support learning at home when they feel more connected to the school; feel more empowered to support learning away from school; and become more knowledgeable about cognitive developmental milestones. As Lehrer and Shumow (1997) note, "knowledge of children's thinking may guide the manner in which adults intervene" (p. 44). The authors call for schools to enable parents to reconstruct academic knowledge for themselves and their children through informal learning experiences away from school; thus, causing a shift in mindset and approaches to engagement in experiences which support school success. Lee and Bowen (2006) report that children from low-income households are more likely to benefit when schools identify connections between parent self-efficacy and parent education as a viable means of supporting struggling students.

As this study's focus is an educative tool for parents, it is important to consider the relevance of adult learning concepts. Malcolm Knowles (1978) points out that pedagogy, the theoretical and practical approaches to helping children learn (p.10), was presumed to appertain to both children and adults alike. Knowles notes that there are "blindspots" (1978, p. 9) in the art and science of teaching children which don't address the unique needs of adult learners. Adopting the term "andragogy" (Knowles, 1973, p. 40) to address this foundational gap, Knowles (1973, 1978) offers a theoretical framework which builds on earlier efforts by John Dewey, Martha Anderson and Eduard Lindeman to examine the prevailing set of assumptions regarding "the art and science of helping adults learn" (Muneja, 2015, p. 57).

Knowles (1973) posits that one of the critical psychological aspects of adulthood is the ability to be self-directed. Adults are defined by life experiences and the various roles they assume, such as parent, employee, or member of a community organization. These life experiences and responsibilities engender a readiness to learn in relation to evolving social roles. According to Knowles (1973), adults tend to enter novel educational situations with a practical "problem-centered orientation to learning" (p. 48) in which new information can be readily utilized in daily life.

The design of this study's parent education newsletter aligns with the premises of adult learning by enabling parents and caregivers to easily identify and choose the information that is most pertinent to their role as informal educators; drawing on life experiences and daily interactions between parents and their children; providing meaningful and straightforward material which empowers parents and caregivers to make informed decisions regarding child rearing and education; considering the barriers such as multiple responsibilities, financial resources and demands on personal time which can hinder parent engagement; and, illuminating mathematical culture and constructive attitudes towards learning (Conner, 1997; Esposito, 2005).

School-to-Home Communication

The literature on school-to-home communication focuses primarily on improved communication to increase parental involvement (Epstein, 1986, 1992, 2006; Christenson, 1995; Fantuzzo, Tighe, & Childs, 2000; Hoover-Dempsey & Walker, 2002). Hoover-Dempsey and Walker (2002) identify several benefits of school-to-home communication, including increased achievement, improved behavior, parental satisfaction and parent support at the school. School-to-home communication in the

literature generally refers to formal notices regarding meetings and conferences, school events, informational newsletters and parent education workshops; emails or phone calls regarding behavior or academic concerns, and informal communications such as chance meetings between educators and parents in the school building (Christenson, 1995; Epstein, 1986b, 1992, 2006; Fantuzzo, Tighe, & Childs, 2000; Gonzalez & Jackson, 2011; Hoover-Dempsey & Walker, 2002).

According to Gonzalez and Jackson (2011), schools which serve low-SES families primarily communicate with parents to inform them about important testing or event dates, or behavioral, social or academic problems, rather than to engage families in learning experiences. Gonzalez and Jackson (2011) note that "the relationship between school efforts to engage parents and achievement appears to be obscured by the fact that the impact of these efforts varies by the socioeconomic status of a school community" (p 331). Jeynes (2010) concludes that educators can be intentional about taking specific steps to increase parental engagement, including educating parents about child development, how to support classroom learning, and on the importance of communicating high academic expectations with their children. Several authors (Ames et al., 1993; Graham-Clay, 2005; McCarthy, Brennan & Vecchiarello, 2011) in the literature discuss the importance of schools moving from a "logistical" communication relationship to a more purposeful, collaborative rapport with families (McCarthy, Brennan & Vecchiarello, 2011, p. 55). Project Tomorrow's annual study of digital learning and parent survey (2018) reinforces this perspective. Project Tomorrow (2018) shares that parents report a preference for written communication which describes what their children are learning, especially with technology, and that parents seek guidance on how

to support classroom learning at home and desire more information related to student achievement. Additionally, the report shares that 33 percent of parents are dissatisfied with the quality and frequency of teacher-to-home communication (Project Tomorrow, 2018).

Gonzalez and Jackson (2011) found that parent engagement in the form of school-to-home communication had a differential effect on student achievement in math and reading based on socioeconomic status; though their study did not describe the type of communication. As there is little in the literature on the effects of newsletter communications to improve math achievement or parents' self-efficacy, this study seeks to add to research on this practice.

Following Vygotsky's sociocultural theory related to the zone of proximal development (1978), consistent print and digital newsletter communications regarding learning at home can support parents with consideration to the financial and time constraints, language, culture, as well as barriers which impact engagement at home. Newsletter school-to-home communication which highlights information, resources and activities which parents can facilitate to help construct and extend knowledge at home serves several purposes: parents feel more connected to the school; parents feel more empowered to support learning away from school; parents become more knowledgeable about cognitive developmental milestones; and, parents develop stronger self-efficacy regarding their ability to support math learning at home.

Cultural Capital

Pierre Bourdieu (1973, 1986) considers links between "legitimate culture", socioeconomic status and educational attainment in his seminal research on cultural

capital (1973, p. 179). Bourdieu coined the term *cultural capital* to define the mindset, culture, symbols of status, preferences and activities that can be strategically used as assets across a lifetime of social interactions. According to Bourdieu (1973), these assets form the basis of *habitus*—attitudes, habits and skills which accumulate and shape one's identity and status within a social class or environment. Bourdieu states that this social history serves as a form of capital which can be put into use or "operationalized" to access resources and affirm one's socioeconomic standing. Bourdieu (1973, 1986) explains that cultural capital takes time to accumulate; has the potential to produce returns; is reproducible and perpetual; and can be invested and exchanged for other forms of capital, such as economic, educational or social. Bourdieu suggests that transmission of cultural capital is hereditary—amassed, often unknowingly, and imparted as "legitimate competence" through subtle and nuanced social exchanges (1986, p. 18).

Bourdieu (1986) identifies three types of cultural capital: embodied, objectified, and institutionalized (Dumais, 2002). *Embodied* cultural capital is the knowledge, perceptions, values and abilities acquired over time through passive or intentionally curated socialization (Bourdieu, 1986). According to Bourdieu (1986), embodied capital is not transmitted instantaneously; rather, it must be directly observed or experienced to be acquired. Bourdieu (1986) reports that *institutionalized* capital is attained through educational accreditations (i.e., college, graduate or professional degrees) and accomplishments (e.g., acceptance into a prestigious university). In this way, institutionalized capital confers a high level of cultural competence to the recipient. Bourdieu (1986) defines *objectified* cultural capital as the tangible resources and experiences (e.g., books, music lessons, or artwork) which acculturate one to a

socioeconomic class. The author notes that objectified capital takes time to accumulate and can serve as economic and symbolic types of cultural capital (Bourdieu, 1986).

Much of the literature on cultural capital explores the connection between education and socioeconomic status (Bourdieu, 1977, 1986; DiMaggio, 1982; Teachman, 1987; Lareau, 1987; Roscigno, Tomaskovic-Devey & Crowley, 2006; Harris & Graves, 2010; Bachman, Votruba-Drzal, El Nokali & Castle Heatly, 2015). The notion that education serves to equalize opportunity among the socioeconomic classes has been widely accepted since the education reform days of Horace Mann (Growe & Montgomery, 2003); yet, Bourdieu (1977) and others argue that schools perpetuate the exclusion of students and families from the lower classes; and, instead, value students and families from the middle-to-upper classes. Several authors (Bourdieu, 1977; Bourdieu & Passeron, 1977; Lamont & Lareau, 1988; Roscigno & Ainsworth-Darnell, 1999) contend that the educational system is directly responsible for social reproduction and the resulting inequities of social practices and institutions. Roscigno and Ainsworth-Darnell (1999) assert that cultural capital is "societally valued knowledge" which, when properly utilized, can be converted into strong prospects of educational success (p. 159). Cultural capital provides tangible resources, knowledge and practices—the habitus—which acclimates members of the upper classes for academic environments. Bachman et al. (2015) claim that differences in "academic socialization" ensue from a lack of cultural capital for members of lower socioeconomic classes (p. 277).

The literature reveals that fewer resources and limited cultural capital result in lower academic success for students from lower SES households (Bourdieu, 1977, 1986; DiMaggio, 1982; Teachman, 1987; Lareau, 1987; Roscigno, Tomaskovic-Devey &

Crowley, 2006). According to the research, educators serve as “regulators”, channeling students with limited cultural capital into educational tracks with anemic educational returns (Bourdieu & Passeron, 1979; Roscigno & Ainsworth-Darnell, 1999). In contrast, Harding, Morris and Hughes (2015) note that several factors reinforce acceptance and success in educational settings for students from the middle and upper classes. The research reveals that children from higher socioeconomic classes benefit from their social standing in multiple ways: they receive more attention and concessions in response to parents who utilize their cultural capital and advocate for a specific teacher or academic track; and advanced maternal education level and other family educational resources, such as private tutors, provide exposure to “language codes and norms of educational settings” (Harding, Morris & Hughes, 2015, p. 66). Additionally, teachers and school staff serve as “educational gatekeepers” and reward by default students who demonstrate knowledge of middle-class culture such as art, classical music or literature (Bourdieu and Passeron, 1979; Lareau, 1987, 2003; Farkas et al., 1990; Lareau & Horvat, 1999; Lareau & Weininger, 2004; Harding, Morris & Hughes, 2015).

According to Goldthorpe (2007), families can expend time and resources towards the education of their children to boost academic achievement and social mobility. Moll et al. (1992) and Ross-Aguilar and Kiyama (2012) explain that the “funds of knowledge” which students from lower SES classes possess serve as a cultural foundation upon which educators should build. Braxton et al. (2013) report that colleges and universities have a stake in identifying students who need help cultivating the habitus which supports strong connections to the academic environment. The authors (2013) propose that the more

cultural capital a student gains, the stronger the degree of integration and persistence in college.

Several studies (Bowen & Bowen, 1998; Comer, 1988; Moll et al., 1992; Ames et al., 1995; Lareau, 2003; Jeynes, 2010) recognize the critical role that parental expectation plays in helping students attach meaning to academic experiences, thereby boosting embodied cultural capital after a significant investment of time, ambition and practice. This suggests that opportunities to cultivate cultural capital can mediate a student's social standing; and, subsequently increase the behaviors which lead to academic achievement (Bourdieu, 1996; Hampton-Garland, 2009).

Chapter 3

Method

This chapter introduces the research methodology and the theoretical framework for this mixed methods study. This study aims to evaluate the impact of an educative newsletter on parent self-efficacy related to mathematics and the impact on the frequency of at-home engagement in mathematics learning practices in households identified as a racial and/or ethnic minority and low-socioeconomic status (SES).

Two theories will be employed as a theoretical framework for this study. Social constructivism theory (Vygotsky, 1986) and social cognitive theory of self-efficacy (Bandura, 1977) will explain the factors which impact participants' perceptions and attitudes about learning and the mediating role of self-efficacy on participants' attitudes and behaviors.

Research Questions

The following research questions are intended to provide answers to the issue posed in the statement of the problem:

1. How does the parent education mathematics newsletter as a form of school-to-home communication impact engagement in informal mathematics learning for parents of low-SES, minority elementary school students?
2. What impact does the use of an educative mathematics newsletter have on the self-efficacy of parents of low-SES, minority students to facilitate informal mathematics learning with their elementary schoolchildren?

Rationale for the Research Design

According to Creswell and Plano Clark (2007), equal reliance on both qualitative and quantitative approaches supports a more comprehensive understanding of the research topic than each methodology alone. Mixed methods research is seen as a practicable means to delve deeper into the quantitative data and to address a broader range of complex questions through the collection and analysis of qualitative data (Creswell, Plano Clark, Gutmann & Hanson, 2003). A mixed methods approach is the most appropriate research design for this study as it employs pre- and post-survey instruments which will quantify respondents' behaviors from self-reports of their habits and attitudes; while the study's focus group interviews will provide a fuller understanding of a smaller sample of survey respondents' experiences and perceptions.

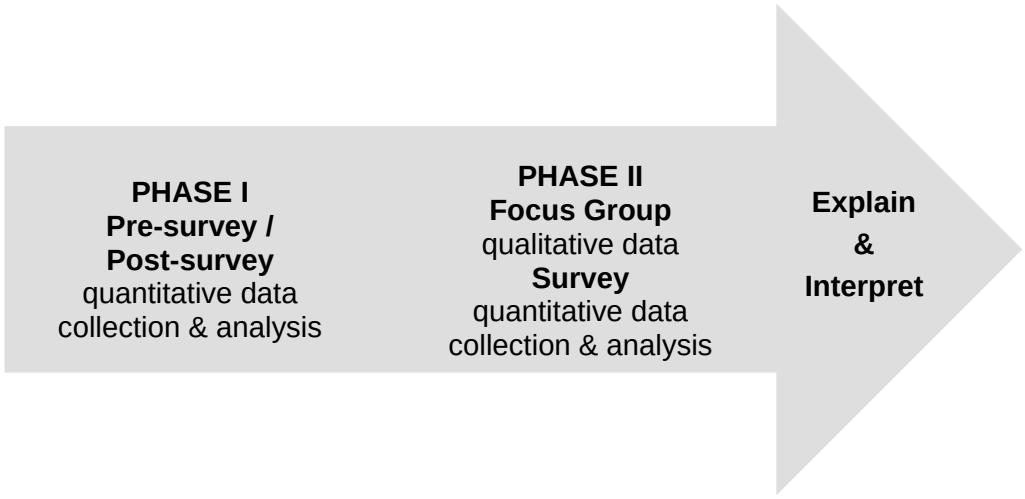
Johnson and Onwuegbuzie (2004) note that a mixed methods study "(c)an add insights and understanding that might be missed when only a single method is used" (p. 21). There are four major types of mixed methods designs–the embedded design, the triangulation design, the explanatory design, and the exploratory design (Creswell & Plano Clark, 2007). The use of an explanatory sequential design to collect and analyze data allows for a synthesis of quantitative and qualitative approaches in two distinct phases (Creswell, 2007). This study will be conducted using the participant selection model (Creswell, 2007), a variant of the mixed methods sequential explanatory design which purposively utilizes quantitative data (pre- and post-survey results) during the first phase to identify participants for a thorough qualitative exploration (focus group interviews) in the second phase. Figure 1 shows the phases of the explanatory sequential mixed methods study design.

This study employs pre- and post- surveys which pose summative scale questions (quantitative data), focus group interviews which pose open-ended questions (qualitative data), and a newsletter satisfaction survey (quantitative data) to assess the impact of the educative mathematics newsletter on parental behavior, attitudes and perceptions. According to Desimone and Le Floch (2004) surveys yield "meaningful, substantive, and informative data (which can) enrich our understanding of educational processes" (pp. 4 – 5). In the case of this study, pre- and post-surveys were an effective method for collecting extensive information from respondents in the first phase which was used to identify participants for a narrower, yet detailed collection of focus group interview data in the second phase (Blackstone, 2012).

This study utilized data from a focus group to substantiate and explain pre- and post-survey data collected during phase one. According to Weiss (1995), qualitative interviews can support a more detailed analysis of a topic, rather than "bits and pieces of attitudes and observations and appraisals" (p.2). The second phase of this research study

Figure 1

Phases of the explanatory sequential mixed methods study design



seeks to interpret each participant's experience interacting with the educative parent newsletter through "fixed-question-open-response" focus group interview questions (Weiss, 1995). Focus group interviews can generate data that has multiple advantages. For example, the "concentrated discussions" of the group dynamic allows researchers to gather large amounts of new information and learn various perspectives on an issue in an efficient manner (Morgan & Kreuger, 1993, p. 8). Albrecht, Johnson, and Walther (1993) describe focus groups as a "communication event" (p. 249) and assert that "discussion of ideas in a group setting increases the external validity of the focus group method and provides data that is more ecologically valid compared to individual interviews" (p. 249). Particularly relevant to this study is Shoaf and Shoaf's (2006) position that the "specificity" of the feedback shared in a focus group by parents who engage with the school in less traditional methods is significant. They contend that

> (a) focus group interview can reach a parent population who may be unable or uninterested in being involved with traditional parent organizations in schools. These parents have an important voice as well, and the format and structure of focus groups can accommodate their schedules and availability. The more parents involved in a meaningful dialogue about their school, the more likely the result of stronger public relations between school and home. (Shoaf & Shoaf, 2006, p. 348)

Focus group participants were also administered a newsletter satisfaction survey. This Likert-scale survey contained 14 items with an interval scale of "very dissatisfied", "somewhat satisfied", "neutral", "somewhat satisfied", and "very satisfied". The newsletter satisfaction survey asked respondents to rate their overall satisfaction with the

newsletter and specific features of the newsletter, as well as the relevance of the content of the newsletter.

Sampling

The study took place at a Title I public elementary school in Houston, Texas which serves 650 pre-kindergarten through fifth grade students. Study participants were recruited from the target population of parents and caregivers who meet the following criteria:

a. identify as members of a racial or ethnic minority group;
b. whose annual household income is less than twice the federal poverty threshold of $48,678 for a family of four with two children in 2016 (National Center for Children in Poverty, n.d.) or who meet eligibility criteria to qualify for free or reduced-price meals in the district;
c. whose children attend the school; and
d. who respond to a Likert-scale pre-survey regarding mathematics learning, behaviors and attitudes.

Participants were a convenience sample of male and female parents and primary caregivers who are at least 21 years of age. The study sight is the researcher's workplace, a Title I elementary school campus with the appropriate target population. A school receives a Title I designation if at least 40 percent of enrolled students are from low-income households (U.S. Department of Education, 2018). Participants self-identified on the demographics section of the pre-survey as a member of an underrepresented racial or ethnic minority group and met an annual household income threshold of less than twice the federal poverty level or met eligibility criteria to qualify for free or reduced-price meals in the district. There were no other exclusion criteria.

According to Privitera and Ahlgrim-Delzell (2019), researchers utilize purposive or purposeful sampling when a study requires the sample to represent certain experiences or characteristics. Convenience sampling is a type of non-probability sampling where members of the target population meet specific practical criteria, such as easy accessibility and willingness to participate (Privitera & Ahlgrim-Delzell, 2019). This study purposively selected participants using convenience sampling from the target population of parents of elementary students identified as minority and low-SES who attend the school (Collins, Onwuegbuzie & Jiao, 2007).

Recruitment flyers for the pre-survey (see Appendix B) are available in English and Spanish. Pre-survey recruitment flyers were posted around the study site, distributed at school events, and disseminated to each student in the school's weekly school-to-home communication folder (called the "Tuesday Folder") and to caregivers at the school's onsite aftercare pick-up station. Invitations for study participants were included in the monthly Math Lab newsletter and on the school and Parent Teacher Organization websites. The researcher extended direct verbal invitations to parents and caregivers to complete the pre-survey during informal interactions before and after school and at school events. Laptop computers with pre-surveys ready to access online were stationed at the entrance of the school as parents arrive for school events.

The study site is one of 160 elementary schools in the largest school district in Texas which serves 209,772 students. The school district's student population is approximately 62 percent Hispanic, 24 percent African American, four percent Asian/Pacific Islander, one percent biracial or multiethnic, and nine percent White. Seventy-five percent of the students in the district are economically disadvantaged. The

study site serves 650 students. The racial / ethnic make-up of the school is 24 percent African American, 56 percent Hispanic, 14 percent Anglo, one percent Native American, four percent Asian/Pacific Islander, and one percent identified as biracial or multi-ethnic. Figure 2 illustrates the demographics of the school study site in comparison to the demographics of the school district. The school is located in a middle-class community with 55 percent of the students identified as economically disadvantaged (qualifying for free or reduced lunch). English Learners comprise 27 percent of the student population and nine percent of the students receive Special Education services. Every student attends a weekly 45-minute ancillary class in the math lab where this researcher facilitates mathematics lessons aligned to the state's educational standards. Math lab lessons focus on computational mathematics, logic puzzles, problem-solving activities, and project-based STEM learning.

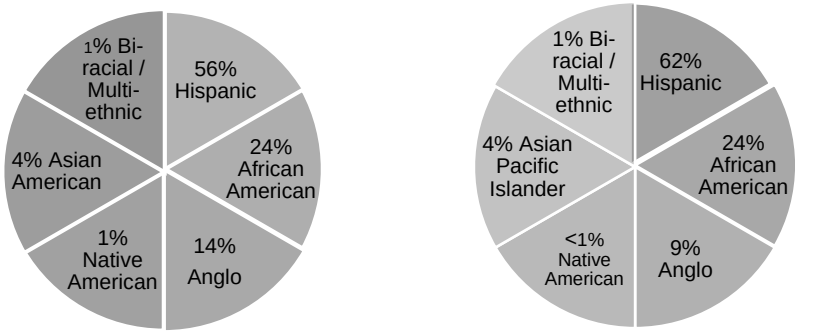
Sample

This study targeted a convenience sample of 50 parents and primary caregivers of students in the elementary school who self-report as Hispanic, African American, Native American, Asian, biracial or multiethnic, and who meet eligibility criteria to qualify for free or reduced-price meals in the school district. This proposed sample represents approximately 19 percent of the total population of parents of low socioeconomic status households from the study site.

Data was collected from sample responses to a Likert-scale pre-survey of knowledge, attitudes, practices and perceptions related to learning, mathematics, academic achievement, and social and cultural activities. The sample was formed into subgroups based on pre-survey responses of parents who reported reading the parent education newsletter and those respondents who did not read the newsletter. Tables and

Figure 2

Demographic data by race / ethnicity of the elementary school study site and the school district



other graphic figures will represent sample responses to the Likert scale pre-survey regarding demographics (race/ethnicity, gender and socioeconomic status) and use of the parent education newsletter information and resources.

Procedures

The researcher created and disseminated a monthly parent education mathematics newsletter at the study site from September 2019 – June 2020 as part of regular parent engagement efforts. Every month a new parent education newsletter is developed by the researcher, printed and distributed to families in a school-to-home communication ("Tuesday" folder) packet. The newsletters provide research, anecdotal and field information, tips, tools, age-appropriate activities, and resources related to child development, parenting, cognition, mindset, and mathematics which parents can use to facilitate informal mathematics learning experiences away from the formal school setting. The newsletters recommend mathematics-themed children's books, common toys and games, and household items which support mathematics learning.

The researcher received advance approval in March 2019 from the school district to conduct the research at the elementary school site. The researcher received approval from the University's Institutional Review Board in March 2020. Items and constructs for the quantitative and qualitative study instruments were planned and developed prior to the study implementation. The instrument development stage involved a review of the literature on behavioral and attitudes scales related to mathematics and learning (Aiken, 1974; Wright & Hendershott, 1992; Fennema & Sherman, 1976; Tapia, 1996; Wong & Chen, 2012; Mohr-Schroeder, Jackson, Cavalcanti, Jong, Schroeder, & Speler, 2017), adapting and constructing new items, and field-testing the instruments. Much of the literature on instrument scale development centered on the attitudes of middle school and high school students or the impact of parental attitudes on student perceptions. To hone the focus on attitudes and behaviors of parents of elementary school students, this researcher constructed new items and adapted items from Aiken's (1974) Enjoyment of Mathematics scale and from Tapia's (1996) Mathematics Attitudes Inventory scale to develop the Parental Attitudes, Behaviors and Perceptions Regarding Learning, Achievement, Self-Efficacy and Mathematics pre- and post-survey instrument and focus group discussion instrument. Field-testing was employed to pre-test the face validity and construct reliability of this study's data collection instruments (Boateng, Neilands, Frongillo, Melgar-Quiñonez, & Young, 2018; Tsang, Royse, & Terkawi, 2017). Field testing enables the researcher to assess response latency, respondent burden, and to identify problems such as ambiguity, bias or lack of readability which respondents might encounter during administration of the instrument (Olson, 2010; Converse and Presser, 1986). For this study, two expert researchers and one veteran elementary school teacher

were recruited to review and provide evaluative feedback on instrument length, item clarity, and item alignment to the theoretical constructs of the study. A survey respondent debriefing was also conducted for the field test with an elementary school paraprofessional (Presser, Couper, Lessler, Martin, Martin, Rothgeb, & Singer, 2004). This involved conducting a timed administration of the study pre-survey with a non-sample respondent and collecting the respondent's reaction to the instrument response options, rating scales, readability and length of the items. After field-testing, the researcher refined the instruments, added a unique QR code and a weblink which took respondents directly to the pre-survey in either English or Spanish, and uploaded the final pre-survey instrument to a web-based platform for administration.

For the quantitative phase of the study, parents and caregivers from the study site were invited to participate in the online self-administration of the pre-survey instrument. There are several benefits to administering online surveys (Evans & Mathur, 2005; Wyatt, 2000; Archer, 2003). Online surveys allow for higher response rates (Cobanoglu, Moreo, & Warde, 2001), as respondents have the flexibility of using laptop, tablet or cell phone computer devices to access scannable QR codes or website links to the survey platform URL. Additionally, multiple respondents can simultaneously access multiple versions of a web-based survey; and the platform allows data to be collected and represented graphically and analyzed efficiently using data analysis software (Archer, 2003). The pre-survey instrument served as the sample identification and study participant recruitment tool. Respondents self-reported quantitative data such as demographic information, familiarity with and use of newsletter resources, implicit theories of intelligence, perceived self-efficacy, and participation in specific educational and cultural

activities. Pre-survey respondents were invited to participate in the post-survey administration. Pre-survey and post-survey responses determined a nested sample of focus group participants for the qualitative phase of this study.

Pre-survey and post-survey respondents who indicated that they utilized the information or resources in the parent education newsletter were invited to participate in a 60-minute focus group discussion moderated at the study site. The elementary school study site was a convenient location for focus group participants as it is a familiar location in close proximity to public transit bus stops and has ample free parking. After the focus group date was determined, participants received emails and paper reminders in English and Spanish. The English-speaking focus group was held in the school mathematics lab and the Spanish-speaking focus group was held in the reading intervention room where tables and chairs were arranged to accommodate the group discussion. Water, coffee and pastries were provided inside the mathematics lab. One of the researcher's teacher colleagues provided childcare for children of focus group participants in a separate wing of the school building to ensure privacy and continuity of the focus group discussion. Participants signed a consent form which informed them about the study and allowed the researcher to record the audio discussion, as well as a non-disclosure agreement to maintain the confidentiality of the focus group. The focus group discussion was audio-recorded on personal recording devices. The moderator of each focus group took hand-written notes. The research purpose and goals of the focus group, and expectations for individual participation and communication were reviewed with the participants. The researcher as moderator posed questions to stimulate and maintain the flow of discussion among participants. A separate cross-lingual focus group

was conducted in Spanish with a bilingual moderator. The moderator of the Spanish-speaker focus group inadvertently turned off the recording device, so that discussion was not audio-recorded. The bilingual moderator facilitated the focus group discussion in the participants' native language and was able to navigate language and cultural subtleties which might preclude valuable data points from target sample participants (Quintanilha, Mayan, Thompson, Bell, & ENRICH Study Team, 2015). Additionally, the bilingual moderator translated the hand-written notes of the focus group session and relayed details from the session with the researcher. Copies of the parent education newsletters were provided in English and Spanish to help participants recall details and to facilitate discussion related to specific content and features which were referenced in survey questions and discussion. Participants were thanked for their contribution to the research study at the conclusion of the focus group. Focus group notes were reviewed, and the audio files from the English-speaker focus group discussion were sent to iScribed transcription service for a full verbatim transcript.

Measures

The following instruments were used to collect data for this study: pre- and post-surveys which posed summative scale questions; focus group interview transcripts of open-ended and summative-scale questions regarding participants' attitudes, behaviors and perceptions related to learning, mathematics, self-efficacy, academic achievement, and social and cultural activities, and a newsletter satisfaction survey which posed summative scale questions.

This researcher created this study's 35-item pre-survey and post-survey of Parental Attitudes, Behaviors and Perceptions Regarding Learning, Achievement, Self-

Efficacy and Mathematics (Appendix A) which poses five-point Likert-scale questions using response scales which were partially adapted from Vagias's (2006) Likert-type Scale Response Anchors. Each item response is scored on a five-point ordinal scale from 1 *(Strongly Agree)* to 5 *(Strongly Disagree)* with a neutral midpoint of *Undecided*. Instrument items are positively and negatively worded for balance. The pre- and post-survey instruments were administered in English and Spanish and measured respondents' self-reported attitudes and behaviors related to learning, achievement, self-efficacy, and mathematics, including the use of home educational resources, or participation in socially or educationally distinctive activities.

The pre- and post-survey instruments contain five items which measure participants' implicit theories of intelligence (Dweck, Chiu & Hong, 1995), eleven items which measure participants' perceived self-efficacy to assist their children academically (Bandura et al., 1996), and ten items which measure participation in activities which contribute to social and cultural capital (Goßmann, 2018). Sample summative items from this scale include "People who are good at math were born with a natural math ability." and "I have the knowledge and skills to help develop or increase my child's math ability." Sample dichotomous close-ended questions from this scale include "Did you try any of the activities or math-themed children's books highlighted in the Math Lab newsletters?". Parents and caregivers reported their usage of the parent education newsletter activities and resources to facilitate informal math learning activities with their children.

This researcher advised a bilingual moderator on how to conduct in-depth focus group interviews of study participants. Researcher-created focus group discussion questions (Appendix C) were developed in tandem with the pre- and post-survey

concentrated on the quality of participants' informal math experiences, implicit theories of intelligence, perceptions regarding impact and value of the parent education newsletter, and participation in social and cultural activities associated with academic achievement. Focus group summative scale questions also sought participants' feedback on the organization of the newsletter, relevance and usefulness of newsletter content, and accessibility of newsletter language and content. The focus group interview instrument consisted of nine fixed-question-open-response questions. While most of these questions explored participant experiences and perspectives consistent with the research objectives and the study's theoretical framework, additional questions were posed during the focus group to further probe participant viewpoints. This approach allowed the researcher to explore ideas which emerged during the interactive discussion.

Analysis

This sequential explanatory mixed-methods study used quantitative data from completed pre-survey and post-survey instruments, quantitative data from a completed satisfaction survey and qualitative data from focus group interviews to answer the research questions.

Quantitative data was analyzed using descriptive and inferential statistics and coded for emergent themes. A chi-square test of independence was used to answer the first research question regarding the impact of the parent education newsletter on parent engagement, and the second research question on the effects of the parent education newsletter on parent self-efficacy. The paired t-test analysis which was proposed to measure the pre-survey and post-survey outcomes was not utilized as the sample size of the post-survey was too small (n=3) to be statistically valid.

A constant comparative method was used to analyze and distill this study's qualitative data. This method of analysis relied on coding techniques to identify connections and categories among the data (Doody, Slevin, & Taggart, 2013; Scott & Medaugh, 2017). The focus group discussion transcript was coded, grouped and analyzed for emergent themes and links to the study's theoretical framework (Boeije, 2002). The data was analyzed, re-analyzed and compared for differences using chi-square statistics. The study's analysis is discussed in detail in Chapter Four.

Chapter 4

Results

"Math can tell the story, you know?"
−Focus group participant

This mixed-methods sequential explanatory study was conducted to evaluate the impact of a parent engagement newsletter as an educative resource to increase parent-self efficacy and boost informal mathematics learning practices in households identified as minority and low-socioeconomic status. The parent engagement newsletter was newly created and disseminated each month in a school-to-home communication folder. The newsletters provided age-appropriate mathematical activities and highlighted research and resources related to child-rearing, cognitive development, and mindset which parents could use to facilitate informal mathematics learning experiences beyond the formal classroom. Additionally, the newsletters recommended mathematics-themed children's books, common toys and games, and household items which support mathematical learning experiences. The study results are based on data collected from parents and caregivers of students in a Title I elementary school via quantitative structured pre-surveys, in-depth qualitative focus group interviews, and a second structured newsletter satisfaction survey. The study addressed the following research questions:

1. How does the parent education mathematics newsletter as a form of school-to-home communication impact engagement in informal mathematics learning for parents of low-SES, minority elementary school students?
2. What impact does the use of an educative mathematics newsletter have on the self-efficacy of parents of low-SES, minority students to facilitate informal mathematics learning with their elementary schoolchildren?

The research phases of this mixed methods study connect and transfer knowledge through the iterative sequential design−a repetitive process of cycling between the data collected at each phase of the analysis (Creswell et al, 2007; Schoonenboom & Johnson, 2017). This chapter presents the research findings and will describe the study participants, report and explain statistics and findings, and explain the analysis of the mixed methods data strands. The quantitative results from the initial research phase are presented first, followed by the quantitative and qualitative results from the second phase of the research. The outcomes presented in the following sections are based on survey data collected from 23 male and female adult parents and caregivers of elementary school students, and focus group interviews and survey data with seven of these same parents and caregivers.

Participants

Study participants were recruited from a pool of 650 parents and caregivers of pre-kindergarten – fifth grade students at a Title I elementary school. Participants responded to an invitation to complete an online pre-survey of parental attitudes, behaviors and perceptions of learning and mathematics between October 2019 and January 2020. Participants self-selected either English or Spanish as the survey administration language. Forty-four parents and caregivers completed the pre-survey. Demographic pre-survey items related to income and race / ethnicity were utilized to identify a target sample of participants who were invited to respond to a post-survey of parental attitudes, behaviors and perceptions of learning and mathematics from January 2020 to February 2020 and to participate in a focus group discussion.

An exploratory analysis was conducted on the pre-survey respondents whose reported household income was $45,000 and below (n = 23) to observe any statistically significant results related to the study themes of self-efficacy, perceptions, attitudes, and behaviors. There were 23 respondents in this cohort of pre-survey respondents, 21 of whom identify as Hispanic and two of whom identify as Black / African American. Twelve of the 23 respondents (52%) completed the pre-survey in Spanish.

Pre-survey demographic responses were used to identify a target sample of participants for the focus group in phase two of the study. Focus group participants were recruited from affirmative responses to Question 33 of the pre- and post-survey, *"Are you willing to participate in a focus group to share more of your thoughts about math learning with the Math Lab teacher?"*. Nonresponse was significant for the subsequent post-survey with only three of the 23 pre-survey respondents completing the post-survey instrument. The 87% attrition rate for phase one surveys and subsequent small sample size (n=3) reduced the post-survey reliability and potentially precluded extrapolation of the statistical analysis results to the overall population.

Quantitative Results – Phase One

Quantitative data for the first phase of this study was collected in the form of Likert-scale pre- and post-surveys of respondents' self-efficacy, behaviors, attitudes and perceptions of learning, mathematics and intelligence. Because of the small sample size of the post-survey responses, analysis was conducted to find statistically significant results using the pre-survey results of the target population.

A Likert-scale survey measured this study's distinct, underlying constructs related to attitudes, behaviors, perceptions, and self-efficacy. After the pre-survey data

collection, a preliminary analysis was conducted using descriptive and inferential statistics. The pre-survey (N=23) has a mean of 59.0 and a standard deviation of 7.18 as shown in Table 2. Composite scores of the study constructs for attitudes, perceptions, behaviors and self-efficacy were created to gain a better understanding of the range of pre-survey responses. Questions 1, 3, 5, 13, 16, 18 and 23 were reverse coded and an overall scoring range of the intervals (*strongly agree, agree, undecided, disagree, disagree strongly*) was created with 42 as the "low" score and 80 as the "high" score. Cronbach's alpha measured the internal consistency of the survey items related to each construct. The pre-survey scale consisted of 32 items (α=.67). The attitudes subscale consisted of five items (α=.20), the perceptions subscale consisted of five items (α=.006), the behaviors subscale consisted of 11 items (α=.05), and the self-efficacy subscale consisted of 11 items (α=.58).

Table 2

Pre-Survey Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Pre-survey Overall	23	25.00	46.00	71.00	59.0000	7.18584
Attitudes Subscale Composite	23	1.00	2.00	3.00	2.5304	.26703
Perceptions Subscale Composite	23	23.25	1.25	24.50	9.5435	10.61534
Behaviors Subscale Composite	23	9.36	.73	10.09	4.0474	3.86063
Self-efficacy Subscale Composite	23	1.33	1.58	2.92	2.1884	.35730
Valid N (listwise)	23					

Of the 23 respondents, 52.2% read the newsletter (Question 30). All respondents who read the newsletter indicated that the information from the newsletter supported their child's mathematical learning (Question 31). Forty-three percent of the respondents reported that they had tried the activities, books or suggestions from the parent education newsletter (Question 32).

Attitudes are defined as lasting patterns of evaluations which people make about objects, ideas, events, or other people which guide a person's behavior and decisions (Bohner & Dickel, 2011). Pre-survey respondents for the 'attitudes' subscale largely revealed overall "fixed" attitudes related to mathematical learning (Dweck, 2008). For example, 52.2% of pre-survey respondents agreed or strongly agreed with the statement, *"People who are good at math were born naturally good at math"* (Item 1) and 100% of pre-survey respondents disagreed or strongly disagreed with the statement, *"Math ability will improve with practice"* (Item 2). As shown in Table 3, 91.3% of pre-survey respondents disagreed or strongly disagreed with the statement, *"Hard work is the most important factor for improving math ability"* (Item 4). Conversely, pre-survey respondents for the 'attitudes' subscale conveyed "growth" attitudes related to learning generally (Dweck, 2008). Additionally, 91.3% of pre-survey respondents agreed or strongly agreed with the statement, *"Struggle and failure are necessary for learning."* (Item 3).

Behaviors are the way in which a person acts or functions in response to a situation, person or stimulus (Cambridge Dictionary, 2020). Pre-survey respondents for the 'behaviors' subscale disclosed varied actions globally related to learning and specifically related to mathematical learning.

Table 3

Q4-Hard work is the most important factor for improving math ability.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	21.7	21.7	21.7
	Disagree	16	69.6	69.6	91.3
	Undecided	1	4.3	4.3	95.7
	Strongly Agree	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

By way of example, 65.2% of pre-survey respondents indicated that they do not share math-related resources with their children (Item 12), while 86.9% of pre-survey respondents revealed that they do not discuss the family's income, saving or spending habits with their children (Item 17), and 82.6% of respondents share that they do not discuss important or interesting topics that they read about with their children (Item 20). In support of mathematical learning, 65.2% of pre-survey respondents expressed that they play math-related games and activities with their children (Item 27) and 60.9% of respondents indicated that there are books, magazines or videos with math ideas or themes in their homes (Item 29). Additionally, 95.7% of respondents disclosed that there is a set place in the home for their child to do homework (Item 28). A chi-square analysis indicated statistically significant relationships between items in the 'behaviors' subscale as shown in Table 4. Respondents who chose 'agree' or 'strongly agree' to items related to pro-learning behaviors were likely to respond affirmatively to other pro-learning items.

The pre-survey 'perceptions' subscale measures the way information about objects, relationships, and events are consciously experienced, interpreted and organized

Table 4

Chi-Square Analysis Statistically Significant Relationships Behavior Subscale

Q20: I discuss important or interesting topics that I read about with my child. Q17: I talk to my child about how our family earns, spends or saves money	p<0.001
Q32: Did you try any of the activities, books or suggestions from the Math Lab Newsletter? Q30: Have you read the Math Lab Newsletter?	p<0.001
Q30: Have you read the Math Lab Newsletter? Q29: There are books, magazines or videos with math ideas or themes in my house.	p=0.012
Q30: Have you read the Math Lab Newsletter? Q27: I play math-related games and activities with my child.	p=0.027
Q26: Board games or card games are available for my child to play with at home. Q27: I play math-related games and activities with my child.	p=0.003

by the senses and turned into meaningful knowledge. The analysis revealed mixed responses regarding connections to their child's school or teacher. For example, 82.6% of pre-survey respondents reveal that they do not feel a positive connection to their child's teachers (Item 10). Additionally, 91.3% of pre-survey respondents perceive that schools do not have a responsibility to support at home learning (Item 8). A majority (91.3%) of respondents indicated that they do not understand the education jargon that their child's teacher uses (Item 6), while 65.2% of respondents disagree or strongly disagree with the statement *"I do not feel a sense of belonging to my child's school"*(Item 23). Only 21.7% of respondents conveyed that they agree with the perception that it is

not easy to find materials to help their children learn math (Item 16). Chi-square analysis indicated a statistically significant relationship (p=0.043) between Item 16 and Item 23, *"I do not feel a sense of belonging to my child's school."* Respondents who agreed with the statement in item 16 were likely to agree with the statement in item 23.

Self-efficacy is the belief in one's capabilities to organize and accomplish the courses of action required to manage potential situations (Bandura, 1995). The 'self-efficacy' subscale largely revealed respondents' overall self-evaluations which reflect a lack of confidence in their ability to aid their children with mathematical learning. For example, most pre-survey respondents (69.5%) indicated that they disagreed or strongly disagreed with the statement, *"I feel confident in my ability to help my child with math assignments"* (Item 7). Additionally, 73.9% of pre-survey respondents revealed that they lack confidence in their ability to help their child see connections to mathematics in their daily life (Item 9), as well as the personal capacity to improve their child's mathematical ability (Item 11). Only 4.3% disclosed that they believe they have the capacity to help their children set goals (Item 19), while 78.2% disagree or strongly disagree with the statement, *"I know how to help my child track his or her progress toward a goal"* (Item 22). All (100%) of the pre-survey respondents conveyed that they lack the confidence to discuss academic progress with their children (Item 24). Conversely, respondents expressed affirmative beliefs in their capacity to engage their children's teachers in discussions regarding academic success. A majority of respondents (82.6%) stated that they disagreed or strongly disagree with the statement, *"I am not comfortable discussing my child's academic progress with his / her teacher"* (Item 5). A minority of

respondents (13%) agreed with the statement, *"I am not comfortable helping in my child's classroom or school"* (Item 18).

A chi-square test showed that Item 11 was statistically significant with Item 24, *"I am confident talking to my child about his or her progress in school"* with a p value of 0.043. A chi-square test conducted between Item 13 *"I feel tense or anxious when I help my child with math assignments"* was significant with Item 18 *"I am not comfortable helping in my child's classroom or school"* with a p value of 0.001.

Quantitative Results – Phase Two

Quantitative data for the second phase of this study was collected in the form of a Likert-scale survey of focus group participants' satisfaction with the parent education newsletter. The reliability analysis for the newsletter satisfaction survey questions showed a Cronbach's Alpha of 0.983, denoting a very strong relationship between the tested variables.

Overall respondent satisfaction with the content, activities, layout, and relevance of the information presented in the parent education newsletter was very high. A frequency analysis of the newsletter satisfaction survey questions produced a consistent score of 4 or 5. The majority of the respondents chose "very satisfied" or "neutral" in response to survey items related to satisfaction with newsletter features and content. None of the respondents indicated dissatisfaction with the newsletter.

A composite score of the survey's satisfaction questions was created to gain a better understanding of the overall range of satisfaction responses. An overall scoring range of the intervals (very dissatisfied, somewhat dissatisfied, neutral, somewhat satisfied, very satisfied) was created with 39 as the "low" score and 60 as the "high"

score. The mean was 56.3, indicating that the majority of responses were “very satisfied” and that the low score of 39 was an outlier. Table 5 and Figure 3 illustrate the statistical satisfaction data related to the parent education newsletter.

Table 5

Frequency Analysis Newsletter Satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	1	14.3	14.3	14.3
	Very Satisfied	6	85.7	85.7	100.0
	Total	7	100.0	100.0	

Figure 3

Histogram of the Overall Newsletter Satisfaction

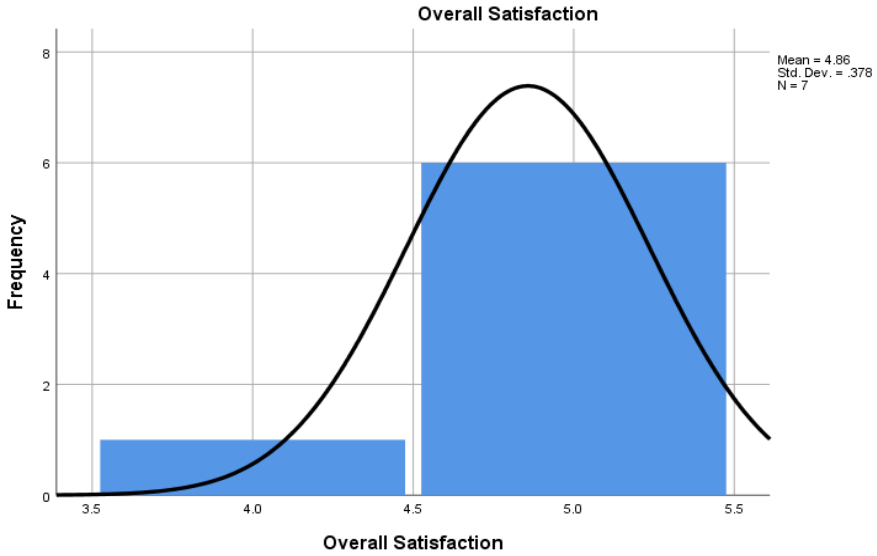


Table 6 indicates high satisfaction levels for the parent educator newsletter with 57 percent of respondents selecting ‘very satisfied’ on every satisfaction survey item.

Table 6

Composite Newsletter Satisfaction Scores

Composite Score	%	n
39	14.3	1
57	14.3	1
58	14.3	1
60	57.1	4

A majority of the newsletter satisfaction survey respondents (85%) stated that they found the information in the newsletter "very relevant". A seventh respondent stated that the information in the newsletter was "somewhat relevant". Table 7 shows the frequency analysis of the relevance scores for the newsletter.

Table 7

Frequency Analysis Relevance of Newsletter Information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Relevant	6	85.7	85.7	85.7
	Somewhat Relevant	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

Qualitative Results – Phase Two

A combination of the constant comparative analysis strategy and classic analysis strategy served as the framework to guide the interpretation of the focus group results (Krueger & Casey, 2015; Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). Constant comparative analysis involves organizing and coding the focus group transcripts and moderator notes into "units" (Onwuegbuzie et al., 2009, p. 5), categorizing the codes, and

identifying themes of the codes (Onwuegbuzie et al., 2009). The classic analysis strategy guides the researcher through steps which support grouping of responses: *1. Did the participants answer the question that was posed? 2. Does the participant's response answer another previously posed question? 3. Does the participant's response say something important about the study focus or themes? 4. Is the participant's response similar to a prior response?* (Krueger & Casey, 2015). Coding enables the qualitative researcher to "summarize, distill or condense data" (Saldaña, 2015, p. 4).

The English-moderated focus group participant responses were recorded with personal recording devices and transcribed professionally with iScribed transcription service. The transcripts and moderator notes for the English-speaker focus group and the moderator notes from the Spanish-speaker focus group were coded manually and using NVivo data analysis software and analyzed for emergent themes. A word frequency query was conducted and checked against initial manual coding.

The initial analysis of the qualitative data included a manual review of the transcript of the English-moderated parent focus group and facilitator notes, as well as the facilitator notes of the Spanish-moderated parent focus group. This involved the application of a basic approach for pattern recognition and thematic analysis upon which to build the subsequent software analysis. Statements and words were evaluated and categorized in an Excel spreadsheet according to their potential application to the following study theoretical headings: *Learning through Social Interaction*, *Home-School Alignment*, *Constructing Meaning through Learning*, *Self-Efficacy* and *Growth Mindset*. Table 8 displays a sample of the manually coded themes as they relate to these study constructs.

The focus group transcripts and moderator notes were reviewed and analyzed for overarching themes. The following section describes the themes which emerged from the analysis of the focus group discussions with parents and caregivers in response to questions related to their perceptions, behaviors, attitudes and self-efficacy regarding mathematics learning. Focus group participants provided insight about how these variables impact their decisions and actions in connection to their at-home learning practices and use of the parent education newsletter.

Table 8

Manual Codes Related to Study Constructs

Learn Through Social Interaction	***Home School Alignment***	***Construct Meaning to Learn***	***Self-Efficacy***	***Mindset***
play	start early	connect to self	practice	rigid
read together	simple real-life concept	draw pictures	confirms what I'm doing	hard work
games	effort from parent	make learning concrete	ask a neighbor	persistence
daily talk	everyday life	the right tools	limits	survived

Mathematics Perceptions and Attitudes

Parents and caregivers' perceptions and attitudes related to mathematics emerged in response to the following questions posed during the focus group: "What words do you associate with mathematics?" (Question 1) and "To be good in mathematics, you need to…" (Question 2). Attitudes about mathematics are closely tied to an ensuing sub-theme of perceptions regarding children's key foundational learning skills.

When asked what words they associate with mathematics, focus group participants shared ideas related to numbers, basic calculations and operations (addition, subtraction, multiplication and division), and word problems. The idea that simple

concepts can build into more complex concepts and extend mathematical learning also emerged. Focus group participants shared the perception that mathematics is about problem-solving and growth.

> ***Focus Group Participant 5****:* "numbers, division, add, subtract".
>
> ***Focus Group Participant 3:*** "If you drop one egg on the floor while you're cooking, you teach them math while you're cooking that, 'now, you need another egg'. It's a concept of individual items leading to an actual math concept."
>
> ***Focus Group Participant 4:*** "…while they're learning math they're also learning how to problem-solve and how to put all that together in this whole math kind of world. That then they use in their own life when they're doing simple things in their own time. And, so they're growing without really thinking about it."

Focus group participants expressed that mathematical learning requires practice, study, work, and support.

> ***Focus Group Participant 7:*** "(success in mathematics can occur with) guidance and the right tools."

Focus group participants relayed personal experiences which supported the perception that mathematics learning can be "rigid" and anxiety-producing. Consequently, focus group participants expressed a desire for a different mathematics learning experience for their children.

> ***Focus Group Participant 3*** (relating a childhood learning experience): "I always felt bad if I got it wrong because it was, it's embarrassing. It's embarrassing. But, I mean, I did it. I survived, but I can see where with my kids, I try not to make

(mathematics learning) so rigid for them, but I can see where that's why I started early with doing all these things."

Learning Attitudes

Parents and caregivers' perceptions related to their children's academic growth was one of the consistent themes which emerged early on during the focus group discussion. Focus group participants connected broader ideas related to growth and problem-solving to mathematical learning. The following ideas and direct quotes from the focus group transcript support this thread of perceptions regarding academic growth. These coded responses also underscore focus group participants' perceptions that reading is a foundational skill which is directly tied to mathematics learning. This sub-theme of key foundational skills is tied to the theme of perceptions related to children's academic growth.

Focus Group Participant 1: "I tell my kids every day, you have to read. Reading is what gets you through everything. Math, science, everything."

Focus Group Participant 4: "I think it's helpful, by the way, with the [newsletter-highlighted math-themed] books, you know, again, for that reading and that foundation…"

Focus Group Participant 1: "Reading as the foundation for every other thing."

Focus Group Participant 2: "So vocabulary is very important."

Focus Group Participant 1: "Everything, chemistry, biology and everything is reading. If you don't understand the prefix, you won't get everything else. If you understand the prefix and then the word after the prefix it changes your whole day."

Forging a connection to mathematical content for their children is a sub-theme which focus group participants identified as important to learning.

> ***Focus Group Participant 2:*** "To have success in math, there's gotta be a connection, which is kind of backing what (Focus Group Participant 1) says, like a personal connection, like to the math learning and their own experiences. So, if there's a connection, then they can apply it to their everyday life."
>
> ***Focus Group Participant 1:*** "And you think they are learning one step, as well as while they're learning math, they're also learning how to solve and how to put all that together in this whole math kind of world. That then they use in their own life when they're doing simple things in their own time. And so, they're growing without really thinking about it."
>
> ***Focus Group Participant 4:*** "With my kids I've seen that they've come to enjoy reading and writing and when they come to enjoy it and be comfortable, mainly comfortable, they can read anything from different views and not be so overwhelmed. But they can take one piece and break it apart because of the way of the, just getting into that fun place of enjoying a good book. And of course, it goes back to the sounds and all that. But if we make it through fun and pleasure in saying that this book tells a story, so does math. Math can tell the story, you know?"

Intelligence Perceptions and Attitudes

Focus group participants overwhelmingly agreed that intelligence can be developed. They acknowledge that intellectual growth requires effort from the parent and the child, and that developing intelligence is a process that is neither easy, nor straightforward.

Focus Group Participant 3: "But we have attained to some intelligence, some increase than where we were. So, it is possible (to develop intelligence). Does it mean that it's going to be easy? No."

Focus Group Participant 1: "You just have to; you just have to do the work (to develop intelligence)."

Parents and caregivers value the benefits of fun and the role of play in cognitive development. Focus group participants repeatedly expressed a desire for mathematical learning to be a fun experience for their children.

Focus Group Participant 2: "But it was all through play and fun and where they could relate that whole connection, relating things really important. And then throwing that vocabulary in the mix."

Parents expressed that it was important for them to know how their children learn.

Focus Group Participant 1: "Knowing how your child learns is huge. And that could be through anything, singing a song or anything, right? And rhythm, I mean learning to skip count or learning to count, for real, skip counting."

Focus group participants stated the belief that children should incorporate writing or drawing skills as they learn and demonstrate understanding of mathematical concepts. Participants recognized that children should manipulate numbers and tools to support learning (Bandura, 1977a; Steele, 2001;Vygotsky, 1978).

Focus Group Participant 1: "If you couldn't show your work and you couldn't explain what you did…, how do I know you even did it? So, I noticed that now it's like they don't want to show their work and I'm like, 'Draw the pictures, it'll help you understand for the next question'."

> ***Focus Group Participant 3:*** "But 'til they experience it; hands on, uh, put numbers on the floor and step on them or something, that concept becomes something that they can physically hold that makes that connection. I think that's a huge thing for… I mean as a parent you to figure that out."

Mathematical Learning Behaviors

This section highlights focus group discussion which centered on the ways (i.e. behaviors) that participants teach their children in daily interactions. A common theme arose related to behaviors which support at-home learning. Much of the discussion from both the Spanish-speaker focus group and the English-speaker focus group centered around how parents and caregivers contributed to their children's learning. These responses were provided across all the focus group questions. The parent education newsletter was referenced as a resource for at-home learning. Additionally, regular use of technology as a means of supporting parent engagement in at-home learning was a consistent topic of discussion. The following examples illustrate the creative and flexible thinking that parents utilize to reinforce at-home learning during moments of typical family bonding. Additionally, the discussion shows that parents understand that children construct meaning through learning experiences.

> ***Focus Group Participant 4:*** "I always use toys, animals. And, so we would talk even little first, second, third, fourth, and, or sometimes we'd sit, play a matching game. But it was all really important. And then throwing that vocabulary in their mix through play and fun and where they could relate that whole connection, relating things really important.
>
> ***Focus Group Participant 3:*** "So, the concepts you give (in the parent education newsletter) you, I'm sure every parent has said, 'Go get a teaspoon from the

drawer, go get a tablespoon, go get a serving spoon.' You've already given them the words and those concepts for, but they may not understand what that quantity is, but when it comes, then later to something you can say, well, remember when we cut the pizza? That's a fraction."

Focus Group Participant 6: "Help with homework and ask what they learned that day at school." (In response to the question, "What are some of the ways that you support your child's learning?")

Focus Group Participant 3: "They learn something by you telling them something, and they can follow what you are saying.

Focus Group Participant 4: "But when I came back, I tried it on them saying, 'You know, let's read, let's enjoy this.' 'What happens?' You know, ask questions and enjoy the book. And, and, also let's make up our own story. I dictate very little of their story and like we'd get into adventures and um, and so it became so comfortable for them to read things and, and see things in a different creative way so that when it was time to come to school or even during the school, cause they do learn different."

Focus Group Participant 3: "I tell (my son), 'It's old fashioned, but it works.' It works. You don't need a box, you don't need draw a line in the middle and you don't need to know how to count by 10, you just don't have to count. You know how to multiply. You use what you know and then figure this out."

Parents and caregivers shared how they push through personal fatigue to create enjoyable learning experiences for their children.

Focus Group Participant 4: "I mean, every night he's asking for a story and I have had tears when (my children) don't get the book and I'm exhausted as a parent. But I go ahead and say, 'You know what, I can enjoy that book with you.' And I'm tired, but I'll enjoy it."

Focus group participants incorporate play, singing and drawing as avenues for teaching mathematics.

Focus Group Participant 4: "I need to see (the mathematical operation). I would draw pictures to show subtraction. Okay, I'm going to draw the two take away, you know? I did that with (my son), I have to say, 'Draw the picture'."

Focus group participants recognize and teach the mathematics in daily life interactions with their children.

Focus Group Participant 4: "…and (teaching mathematics) especially through play, making it fun. So, you know, the baking's fun. I always use toys, (and) animals."

Parents and caregivers conveyed how they incorporate mathematical language and vocabulary into conversations with their children.

Focus Group Participant 4: "And (my children) were aware of (the mathematical connections) by the way, because we talked about it. It was daily talk, daily interaction…"

Focus group participants revealed that they set parameters for learning at home, such as starting homework straight away, monitoring their children's work during the process, requiring their children to explain verbally and in writing their process for

solving mathematics problems, verifying mathematical procedures using online resources or checking with experts who are accessible in their community.

> ***Focus Group Participant 1:*** "And they don't have notes. So, I'm like, 'Okay, let me try something'… I'm texting my neighbor who's a teacher like, 'How do I do this?'"

Parents and caregivers communicated that they actively seek ways to understand what their children are learning to be able to help with homework.

> ***Focus Group Participant 7:*** "I can look up videos on YouTube to learn the way she learns to solve mathematical problems with her."
>
> ***Focus Group Participant 3:*** "…I have texted our first-grade teacher, saying 'I'm stuck'."
>
> ***Focus Group Participant 3:*** "[I tell my child] I'm going to show you the way you are going to understand it and then we will apply it to how your teachers [taught it].

Technology Ambivalence

The subject of technology emerged organically during the discussion with the English-moderated group. This was an opportunity for the researcher to further probe participants' behaviors and attitudes towards technology as a learning resource, in part because the parent education newsletter suggested few technology-based activities, tools or resources as a means of supporting mathematics learning at home. Focus group participants largely expressed ambivalence about technology and its applications for mathematics learning. In response to the unstructured question, "How does technology help or hurt your efforts to support your children's learning at home?", focus group participants all agreed that they required the use of some form of technology to help their

children with mathematics homework, particularly if they did not have access to a textbook or notes from the teacher. Several participants expressed reservation about the current use of technology learning resources in comparison to their own childhood learning experiences. Most participants believed that technology prevented their children from fully understanding mathematical concepts and that technology takes away from a robust learning experience. One of the focus group participants described her attitude toward technology as "50/50" because her child benefitted from technology-assisted speech and language therapy.

> ***Focus Group Participant 2:*** "Everything is technology. You see kids with all these phones and laptops and different things like that, but you just still have to teach them the old ways of doing things."

Participants all agreed that they needed to use some form of technology to help their children with homework.

> ***Focus Group Participant 7:*** "[The newsletter] has helped with me, so I can look up videos on YouTube to learn the way she learns to solve math problems with her."
>
> ***Focus Group Participant 3:*** "I get why it's there, but I had to like, truly I would tell (my son), 'Okay, you go do the other problems.' And here I am watching YouTube, we're figuring out how to do a mock and I looked at him and said, 'Okay, we're going to only do this because your math teacher says you're going to have to, but look at me, we're not doing this normally. It's not just not happening.'"

Participants believed that technology prevented children from fully understanding mathematical concepts and that technology undermines the learning process.

> ***Focus Group Participant 3:*** "(Technology) may hurt in the sense that it takes away from them actually sitting down in front of a piece of paper and writing everything down, drawing the pictures, you know, doing things like that."
>
> ***Focus Group Participant 1:*** "I think that's what technology takes away from what they do in regards to actually showing them the work. Cause you know, yeah, you can sit in front of the laptop all day and see all types of numbers and, 'Oh I know that,' but are there, they do the drawing for you. They pop up the pictures and it's just different. It's different when you have to write it out yourself."
>
> ***Focus Group Participant 3:*** "To me it's mindless. It is a very passive way of doing something and… I want (my children) to be active learners. I want them to understand and I want them to be okay with having an opinion and being wrong. Whereas when you're always on that machine or unit, it's, you're never wrong. You'll never get it or work it out."
>
> ***Focus Group Participant 1:*** "If you couldn't show your work and you couldn't explain what you did, then, how do I know you even did it? So, I noticed that now it's like they don't want to show their work and I'm like, 'Draw the pictures, it'll help you understand for the next question'."

Parents tied the use of technology to schools providing parents with access to resources directly related to what their children are learning in the classroom and to their homework.

> ***Focus Group Participant 1:*** "If we're going to put technology in the room, all of these textbooks that teachers are using are available online. They're available online."

Parent Education and Communication

The subthemes of parent education and school-to-home communication emerged as key threads across all other subthemes related to support from teachers and the school to support learning at home. The word frequency query revealed that parents and caregivers want more help, regular communication, and specific information from their child's teachers and school about what their children are learning in the classroom and how to support math learning at home. One parent specifically mentioned the benefit of a parent education meeting with the fourth-grade writing teacher clarified her role as a parent teacher and how to support reading and writing at home. Another caregiver shared that she wanted a parent education course over the summer to help prepare herself for the math concepts that her child would be learning in the upcoming school year. Figure 4 shows the prevalence of the word "help" and other key words during the focus group discussions.

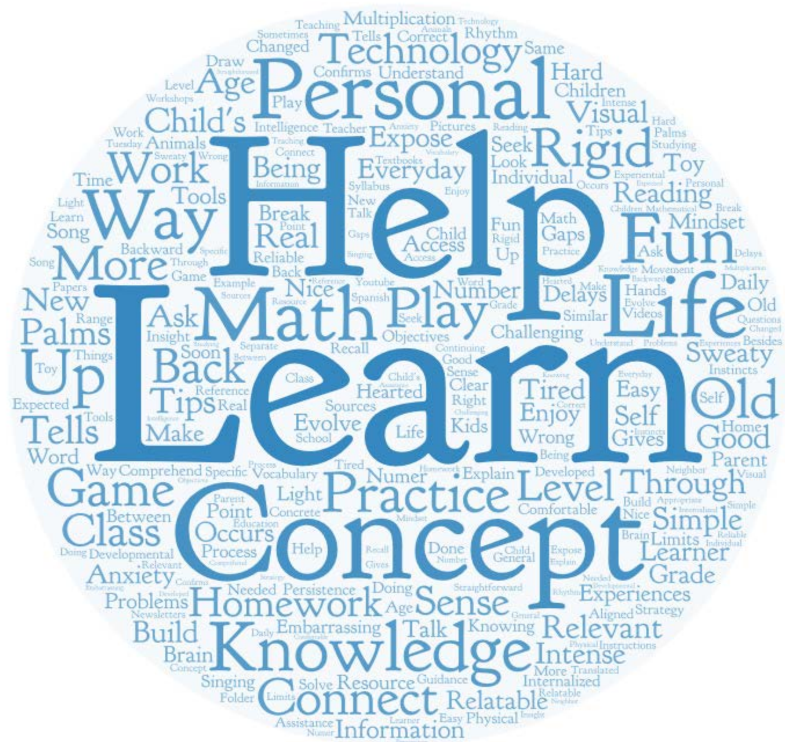
Parents want support and guidance from the school such as parent education workshops to know what mathematical skills their children will be taught for the year.

> ***Focus Group Participant 2:*** "[We want] (m)ore information, more information…"
>
> ***Focus Group Participant 3:*** "Well, what are those, what are those concepts? I mean I would have loved to know about these during the summer…like box method and the division methods and the butterfly method, cross multiply…"

Focus Group Participant 1: "Yes, I mean, I enjoyed the parent night that they had …for Mrs. Albert's class. I thoroughly enjoy that…That was just an expectation and while you were there the teacher made you go through it [to know how to support your child's learning]."

Figure 4

Frequently Used Words – Focus Group Discussion



Parents expressed frustration that mathematics homework often does not come with textbooks, instructions or notes explaining what students had been taught, and the perception that concepts in the assigned homework often have not yet been taught.

Focus Group Participant 1: "I remember getting textbooks all the time (when I was an elementary student) and … you know I ask (my daughter), 'Okay so what did the teachers say?' Because, and I'm telling her 'I can't explain it to you cause

I'm not there. I need you (to know what is expected).' And then notes (from the teacher about homework), it's like, where are they? I'm looking for notes, right?"

Focus Group Participant 3: "…But put the book, put something so that we have it on hand because you want… [to help your child at home]."

Focus Group Participant 1: The teacher hasn't taught it yet, but that's part of the homework for that day.

Focus Group Participant 1: "And they don't have notes. So, I'm like, 'Okay, let me try to figure this out.' I'm texting my neighbor who's a teacher like, 'How do I do this?' Like help me, you know?"

Newsletter Feedback

The focus group discussion specifically related to the parent education newsletter was universally positive. All focus group respondents expressed statements related to enjoyment of the newsletter, the overall content, and to its helpfulness. Participants from the Spanish-speaker focus group expressed appreciation that the newsletter was available in Spanish. The math joke was well received. No feedback was given about changing the newsletter content. Participants made clear statements that the newsletter introduced them to new content and vocabulary. They also stated that the newsletter affirmed their belief in their parenting ability (i.e., self-efficacy) and confirmed the appropriateness of specific parenting choices. Table 9 highlights the fixed-question-open-response items related to the parent education newsletter that were posed to focus group participants.

Focus Group Participant 1: "(The newsletter) allow(s) the parent from this, not thinking that they're totally off-base."

Table 9

Newsletter-related Focus Group Questions

1. Did the math newsletters help increase your knowledge of how to support math learning?
2. In what way is the math newsletter a useful resource for parents and caregivers?
3. Did the math newsletter provide you with new information related to how children learn?
4. Should the school continue to provide the math newsletter to parents and caregivers?

Focus Group Participant 2: (The newsletter) show(s) us and …give(s) us a tool. These are like the tools you give parents. Uh, then we can turn around and use it to our advantage and you know, tweak, whatever."

Focus Group Participant 4: "It's also helpful that it's kept simple and to the point and you give a lot of like support, you know, how you put helpful tips, you know, a lot of insight and you say the medical science, which research study said, you know, you get sources that are very helpful, uh, reliable."

Focus Group Participant 7: "It helped me and my wife to help our daughter with her homework."

Focus Group Participant 2: "The vocabulary of (the parent education newsletter). That helps. That's helpful because it gives them, gives us, okay, remember look at this. Remember this, we were talking about this number sentence."

Focus Group Participant 4: "And then here, for example, in the helpful tips (of the newsletter), 'children with more advanced math ability can identify fractions or calculate the percentage of decorated homes in your neighborhood'. But then (the newsletter says), 'reinforce early math skills by…', and (the newsletter)

> give(s) us that foundation that we can to get to that point. You know, you give us that based on the color shapes and patterns of holiday lights. You know, this is on page two of two, but it's good. You know, you tell them 'this is the expectation,' this is, and 'this is something you can do to support', that, like, reinforced (the concept)."
>
> ***Focus Group Participant 2:*** "It puts you in their [the child's] mindset.
>
> ***Focus Group Participant 5: "***Yes, but it would help more if it was a single page and that it was given separately from other [classroom materials in the parent communication folder]."
>
> ***Focus Group Participant 3:*** "Any person not knowing, having a background of anything, could read it and follow it."

Post-focus group participant validation, or member checking, was conducted with three of the seven focus group participants as a method of confirming and validating the results of the focus group analysis (Birt, Scott, Cavers, Campbell, & Walter, 2016). Two of the three respondents affirmed their perspectives that the monthly parent education newsletters promoted a positive change in attitude, perception or behaviors related to math learning. Focus Group Participant 4 stated, "(The newsletter) was relatable and easy to understand and I could turn around and do the activities at home without a problem. I felt competent to read, understand, connect, and promote/perform a math learning environment at home." Focus Group Participant 3 stated, "(The newsletter) did change the way I presented an idea. Knowing how a concept or how an idea was been looked at/taught allowed me to reinforce and reteach the idea or concept with words (my kids) heard before." Additionally, all three respondents asserted that the parent education

newsletters be a helpful tool during the Coronavirus pandemic as they are supporting virtual learning for their children at home. Focus Group Participant 4 suggested, "The… newsletters would be a helpful successful tool if it REPLACED some of the math learning assignments already assigned, so that it would not be too much or overwhelming. I would enjoy the hands-on learning rather than computer learning, maybe a healthy BALANCE between online and hands-on learning." Focus Group 3 declared that she would welcome the parent education newsletters because, "Virtual learning seems a very passive way to learn. I sometimes run out of ideas on how to make it memorable and make that building block in their mind. All I know is, math is something you must do every day to build on. However, as a mom/everything, it's hard to find innovative ways with two kids on two different levels."

Summary

Descriptive statistics, inferential statistics and the data gathered from the pre-survey of attitudes, behaviors, perceptions and self-efficacy; the focus group discussion; and the newsletter satisfaction survey provided insight regarding the study's research questions. Cross tabulation and chi square were employed to investigate the relationship between study variables and showed statistical significance between study subscales strengthening the analysis of the study outcomes.

This study does not have post-survey data to support the hypothesis that the parent education newsletter boosts parent self-efficacy; however inferential statistics of pre-survey responses and statements from the focus group participants suggest that the parent education newsletter confirms existing intuitive parenting practices which support mathematical learning in the home and that the newsletter provides enough varied

information and tools which strengthen parents' capacity to engage in meaningful mathematical learning practices.

This chapter presented quantitative data gathered from surveys and qualitative data from focus group interviews. The findings considered the impact of the parent education newsletter on parents' behaviors, perceptions, attitudes and self-efficacy related to mathematical learning outside the formal school setting. Chapter 5 discusses the conclusions, policy and practice considerations, and limitations of this research study.

Chapter 5

Analysis

The purpose of this study was to examine the impact of a parent education mathematics newsletter on informal mathematics learning for parents of low-SES, minority elementary school students and the impact of the newsletter on the self-efficacy of parents of low-SES, minority students to facilitate informal mathematics learning at home.

Data from 2017, 2018 and 2019 district-level mathematics assessments show that students at the campus study site struggle with numeracy−basic number concepts and skills−as well as number composition and decomposition, fact fluency and proportions. This is particularly concerning because third and fourth grade students on this campus are not able to demonstrate a working knowledge of the most basic mathematics skills upon which advanced mathematical knowledge builds, including working flexibly with numbers. Further, parents at the campus study site have expressed anxiety about their capacity to support mathematics learning at home and want to gain more knowledge of mathematical content and practices which reinforce student engagement and mathematical skills. This study seeks to fill a gap in the literature related to the use of parent education newsletters to engage and inform parents about the behaviors and attitudes which support mathematical learning in the home.

Conclusions and Interpretation

Survey data collected from 23 male and female adult parents and caregivers of elementary school students, and focus group interview data and survey data with seven of these same parents and caregivers demonstrate the following: At least half of the survey

respondents (52%) read the parent education newsletter, and 100% of those respondents asserted that the information presented in the newsletter supported their child's mathematical learning. Forty-three percent of the respondents stated that they had tried the activities, books or suggestions from the parent education newsletter. Analyses of the newsletter satisfaction survey showed strong respondent satisfaction with the specific features, content, activities, layout, and relevance of the information presented in the parent education newsletter. Focus group participants indicated that they recognize the importance of supporting learning at home but desire a stronger alignment between the home and school learning environments, a better understanding of mathematical learning, and awareness of the practices which support and sustain the development of mathematical knowledge.

Descriptive statistical analyses of the pre-surveys showed that parents whose perceptions of their self-efficacy was high were likely to respond in a similar manner to other questions of that construct. For example, a chi-square test conducted between Question 9 ("I know how to help my child see connections to math in his/her daily life.") and Question 11 ("I have the knowledge to help develop or increase my child's math ability") showed a statistically significant association between these two self-efficacy subscale variables. Bandura (1977, 1986) notes that cognitive self-evaluations such as these from the self-efficacy subscale can affect an individual's behavior, including the goals they set and the energy they put towards the completion of those goals. Self-efficacy− an individual's belief in his or her capability to execute the actions needed to produce specific outcomes (Bandura, 1977)−affects an individual's ability to surmount hurdles such as those which parents encountered with their children during homework

sessions. Study participants who read the parent newsletter and used the resources or activities from the newsletter demonstrate their persistence in supporting their child's education by seeking out resources and incorporating those resources efficiently (e.g., texting a neighbor) and effectively (e.g.,. substituting a mathematical algorithm for the required mathematical procedure during homework) for their families.

As noted in Chapter 4, the 'perceptions' and 'attitudes' presurvey subscales revealed interesting and mixed responses related to mathematical learning and learning overall. Pre-survey respondents for the 'attitudes' subscale largely revealed overall "fixed" attitudes related to *mathematical* learning, while revealing "growth" attitudes related to learning generally (Dweck, 2008). These findings are consistent with the related literature tied to the theoretical framework of neuroplasticity and mindset and of knowledge construction. As noted in the literature, mathematics-related anxiety and attitudes about intelligence and achievement impact one's education-related beliefs and expectations (Blackwell, Trzesniewski & Dweck, 2007; Keat & Wilburne, 2009).

Similar to the literature on self-efficacy, Dweck's (1998) research on mindset−an individual's established set of attitudes and beliefs−found that how an individual perceives their abilities will affect motivation and achievement outcomes. A contrast can be noted between pre-survey respondents whose attitudes and perceptions related to mathematics learning were mainly fixed and/or negative and focus group participants who demonstrated more flexible attitudes and perceptions related to mathematical learning which enables them to proactively demonstrate behaviors in support of mathematical learning. For example, focus group participants demonstrated growth attitudes and perceptions related to mathematics and learning in general through

recognition of reading as a critical foundational learning skill; efforts to build on simple concepts in daily interactions with their children, and perception that intelligence and mathematical ability can be improved with practice and study. It is possible that these ideas enabled focus group participants to move on from negative mathematics learning experiences and create fun, meaningful connections to mathematics for their children. Conversely, while 91.3% of pre-survey respondents agreed or strongly agreed with the statement, *"Struggle and failure are necessary for learning,"* this cohort did not believe that they had the capacity to personalize learning for their children or help their children set goals and monitor their progress towards accomplishing goals. The focus group participants indicated that knowing how their children learned enabled them to personalize at-home learning experiences and support connections to mathematics in an effort to boost academic achievement. This suggests that the parent education newsletter could help promote more positive attitudes related to mindset and cognition for those pre-survey respondents who demonstrated overall unfavorable perceptions related to mathematics.

The pre-survey attitudes subscale Mean was 2.53 and the pre-survey perceptions subscale Mean was 9.54. Table 10 shows the composite scores of the pre-survey respondent attitudes.

Important subthemes related to supportive learning behaviors emerged from the pre-survey and focus group discussions. Consistent with the literature on parent engagement on at-home learning (Epstein et al., 2004; Fantuzzo, McWayne, Perry, & Childs, 2004; Jeynes, 2011), parents and caregivers want a stronger connection to the school and better communication with the teachers in order to support mathematics

Table 10

Pre-Survey Attitudes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.00	1	4.3	4.3	4.3
	2.20	5	21.7	21.7	26.1
	2.40	3	13.0	13.0	39.1
	2.60	7	30.4	30.4	69.6
	2.80	6	26.1	26.1	95.7
	3.00	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

learning at home. Focus group responses support the notion that parents who are traditionally perceived as uninvolved in their child's education are actively supporting or seeking ways to support their child's education at home. Parents and caregivers who participated in the focus groups are attentive to their children's academic growth and they discuss goals and progress with their children. Additionally, they express a desire for mathematical learning to be a positive experience with a focus on fun, hands-on learning, and less reliance on technology to teach mathematical skills, specifically. While the focus group discussion doesn't distinguish between past parenting behaviors and current at-home learning behaviors and the direct impact of the parent education newsletter on those behaviors, it is evident that the parent education newsletter impacted participants' attitudes and perceptions related to at-home learning. The parent education newsletter sought to make parents and caregivers cognizant of the age-appropriate toys and play materials commonly found in the home to reinforce mathematical learning. Indeed, in accordance with the constructivism literature, participants were constructing knowledge from the parent education newsletter and comparing it against their prior knowledge. As

Focus Group Participant 3 noted, "(The newsletter) supports what we're trying. I mean granted you don't sit there and, say, '(T)ake metals, mixing bowl and place XYZ'. You're not giving us a recipe to do it with, but you're allowing,…you're confirming that we're not wrong for some of the things we're doing." Consistent with research by Piaget (1952), Vygotsky (1978), Bruner (1972) and Erikson (1950), focus group participants demonstrated understanding of the intersection of play, social interaction and the environment in helping children construct mathematical knowledge during daily family time. For example, Focus Group Participant 4 expressed the importance of "…(teaching mathematics) especially through play, making it fun. So, you know, the baking's fun. I always use toys, (and) animals."

Consistent with the literature on parent education and the study's theoretical framework related to sociocultural theory and cultural capital, the study results show that embodied cultural capital supports positive attitudes towards learning which knowledgeable parents can operationalize (Bandura, 1977a; Bourdieu, 1996; Hampton-Garland, 2009). For example, most pre-survey respondents indicated that schools do not have a responsibility to support at-home learning−a fixed mindset. In contrast, focus participants who believed that schools do have a responsibility to support at-home learning, expressed a desire for this type of support. This perspective enables focus group participants to "operationalize" their growth mindset and knowledge of the limits of their understanding of mathematical content, and seek to move beyond that "zone of proximal development" (Vygotsky, 1978) to increase their capacity to support a rich mathematical culture. Specifically, focus group participants identified a need for parent seminars which explicitly review mathematical content and regular guidance from the

school in the form of parent education newsletters which addresses each content area separately, including a separate parent education newsletter for mathematics, reading, science, social studies, and other relevant content areas. Indeed, the parent education newsletter was referenced in the pre-survey and focus group discussions as a helpful resource for mathematical learning at home. This perspective is also consistent with the literature on parent education and the need to address the unique needs of adults who are balancing various life responsibilities and roles and seek a practical way to incorporate helpful parenting information into their daily lives (Epstein, 1986, 1992, 2006; Esposito, 2005; Knowles, 1973).

Parents and caregivers expressed significant ambivalence towards the regular use of technology as a means of supporting learning at school and parent engagement in at-home learning. They expressed doubts about their children's ability to construct meaning through learning which is technology based and understand that learning occurs through social interactions, movement, writing and physical manipulation of objects. This sentiment is especially relevant now as the world is experiencing the Coronavirus pandemic. School buildings are closed and the system which primarily engages students in face-to-face learning is now attempting virtual learning. While the flexibility of technology-based learning tools was acknowledged, study respondents conveyed a preference for established, conventional methods of teaching and learning through use of inquiry and reference texts.

The study results indicate that the parent education newsletter influenced the attitudes, behaviors and perspectives of parents to facilitate mathematics learning at home. The parent education newsletter can help parents address foundational gaps that

students from lower-SES households often present in elementary school by addressing both the parent's zone of proximal development related to mathematical content and parenting practices which reinforce cognitive and academic growth, as well as the student's zone of proximal development (Steele, 2001; Vygotsky, 1978)

Implications for Practice

Based on the study results reported in Chapter Four, schools can readily adopt a content-based parent education newsletter to engage families in high-yield mathematical learning practices at home. Study outcomes are consistent with the literature review and demonstrate that parent support in the form of parent education newsletters can play an important role in equitable school-to-home alignment by providing practical tools and information to increase family engagement in mathematics learning. Schools which serve low-SES students and their families will need to consider the strengths and barriers of the targeted family population, such as language and time constraints, which impact family engagement in at-home learning. Parent education newsletters can be readily tailored to the unique needs of a school's demographics and provide a much-needed balance to increase understanding of academic content, child development and actions to boost learning away from the academic setting.

The specific feedback about this study's parent education newsletter suggests not only that the practice of the parent education newsletter is needed, but that the specific format, content and activities are relevant for consideration. Newsletters can be informative, interesting and support engaging mathematics learning in fun and simple ways at home. Consideration will need to be given to the reading level and language spoken at home for the target population.

Study results suggest that the parent education newsletter boosts self-efficacy for parents who seek to support mathematical learning at home. Because of the small sample size and lack of post-survey data to compare pre- and post- behaviors, attitudes, perceptions and self-efficacy of parents and caregivers one can infer that the practice would benefit parents who lack confidence in their mathematical knowledge or their ability to boost their child's mathematic achievement through social at-home learning activities.

Limitations of the Study

Limitations of this study include the effect of respondents' introspective ability of self-reported measures and the lack of a transcript for the Spanish-speaker focus group discussion.

Implications for Further Research

This study focused on the impact of a parent education newsletter to impact mathematical learning practices in the home. Studies on the impact of engagement in at-home learning for other content areas and specific grade levels would inform the literature. This study had one male focus group participant. Future research could consider the impact of parent-engagement strategies on fathers and male caregivers. Additionally, teachers of special education students and other students with special needs would benefit from a study which analyzed outcomes for this student population.

This study's initially proposed data analysis included a structural equation modeling (SEM), a multivariate technique that could be used in conjunction with the paired t-test to hypothesize causal relationships among the variables related to self-efficacy, mindset and behavior. Lomax and Schumacker (2004) suggest this method to

achieve stronger “validity and… reliability of observed scores from measurement instruments” (p. 5) of independent latent variables (e.g., cultural knowledge) and dependent latent variables (e.g., sample attitudes). SEM would produce interesting outcomes for future study.

Should future in-depth research demonstrate conclusively that the use of parent education newsletters promotes positive parenting practices, attitudes towards mathematics, and self-efficacy schools and school districts could consider incorporating these as part of a broader parent engagement and family engagement strategy. Given the demographic and economic projections for the Houston area, public school educators will need to consider how the significant increase in the number of English learners, and Asian and Hispanic students from lower-income families will impact their practice. The practices promoted by this study and future studies on the topic will be an additional resource for educators of the most vulnerable student populations.

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Appendix A

Table 11 Focus Group Word Frequency

Theme or Code	Frequency	Cumulative Percentage	Example Participant Quotes
Connection to mathematical content	4	5.6%	I think also to have success in math, there's gotta be … a personal connection, …to the math learning and their own experiences.
Fun learning mathematical content	6	8.4%	But if we make it through fun and pleasure in saying that this book tells a story, so does math, math can tell the story, you know?
Simple concepts to build mathematical learning	5	7.0%	They're doing simple things in their own time. And so they're growing without really thinking about it.
Related / relevant to mathematical learning	3	4.2%	Learning…, not something extra, homework that is not related to what they learn.
Reading is important to learning	5	7.0%	Reading is the foundation for every other thing.
Help wanted from teachers / helpful tips in newsletter to support at-home learning	3	4.2%	It's also helpful that it's kept simple and to the point and you give a lot of like support,… how you put helpful tips, …, a lot of insight.
Technology: Ambivalence toward	3	4.2%	It may hurt in the sense that it takes away from them actually sitting down in front of a piece of paper and writing everything down, drawing the pictures, you know, doing things like that.
Understanding mathematical concepts	3	4.2%	So you know your limit of how far a concept is going to go...
Practice is needed for success in mathematics	2	2.8%	To be good in math you need to practice.

Appendix B

Table 12 Focus Group Themes and Theoretical Constructs

Theme	Theoretical Construct
Learning Attitudes	Constructing Knowledge Neuroplasticity Cognition Mindset Self-efficacy
Home-School Alignment	Constructing Knowledge Neuroplasticity Cognition Mindset Parent Engagement Cultural Capital
Mathematical Learning Behaviors	Constructing Knowledge Neuroplasticity Cognition Mindset Parent Engagement Self-efficacy Cultural Capital
Intelligence Perceptions and Attitudes	Constructing Knowledge Neuroplasticity Cognition Mindset Self-efficacy
Mathematics Perceptions and Attitudes	Constructing Knowledge Neuroplasticity Cognition Mindset Self-efficacy
Parent Education and Communication	Neuroplasticity Cognition Mindset Parent Engagement Self-efficacy
Newsletter feedback	Constructing Knowledge Neuroplasticity Cognition Mindset Parent Engagement Self-efficacy
Technology Ambivalence	Constructing Knowledge Neuroplasticity Cognition Mindset

Appendix C

Parent Pre-Survey / Post-Survey Questions

Please use the following scale to identify how much you agree with the statements in #1 - 25

Strongly Agree Agree Undecided Disagree Disagree Strongly

1. People who are good at math were born with a natural math ability.

Strongly Agree Agree Undecided Disagree Disagree Strongly

2. Math ability will improve with practice and good study habits.

Strongly Agree Agree Undecided Disagree Disagree Strongly

3. Struggle and failure are necessary for learning to occur.

Strongly Agree Agree Undecided Disagree Disagree Strongly

4. Hard work is the most important factor for improving math ability.

Strongly Agree Agree Undecided Disagree Disagree Strongly

5. I am not comfortable discussing my child's academic progress with his / her teacher.

Strongly Agree Agree Undecided Disagree Disagree Strongly

6. I understand the education language that my child's teachers use.

Strongly Agree Agree Undecided Disagree Disagree Strongly

7. I feel confident in my ability to help my child with math assignments.

Strongly Agree Agree Undecided Disagree Disagree Strongly

8. Schools have a responsibility to provide families with resources to support learning at home.

Strongly Agree Agree Undecided Disagree Disagree Strongly

9. I know how to help my child see connections to math in his/her daily life.

Strongly Agree Agree Undecided Disagree Disagree Strongly

10. I feel a positive connection with my child's teachers.

Strongly Agree Agree Undecided Disagree Disagree Strongly

11. I have the knowledge to help develop or increase my child's math ability.

Strongly Agree Agree Undecided Disagree Disagree Strongly

12. I share educational books, magazines, websites or videos about math with my child.

Strongly Agree Agree Undecided Disagree Disagree Strongly

13. I feel tense or anxious when I help my child with math assignments.

Strongly Agree Agree Undecided Disagree Disagree Strongly

14. I feel more confident reading with my child than doing math activities with my child.

Strongly Agree Agree Undecided Disagree Disagree Strongly

15. My child participates in dance, music or art lessons outside of school.

Strongly Agree Agree Undecided Disagree Disagree Strongly

16. It is not easy to find materials to help my child learn math.

Strongly Agree Agree Undecided Disagree Disagree Strongly

17. I talk to my child about how our family earns, spends or saves money.

Strongly Agree Agree Undecided Disagree Disagree Strongly

18. I am not comfortable helping in my child's classroom or school.

Strongly Agree Agree Undecided Disagree Disagree Strongly

19. I can help my child set goals.

Strongly Agree Agree Undecided Disagree Disagree Strongly

20. I discuss important or interesting topics that I read about with my child.

Strongly Agree Agree Undecided Disagree Disagree Strongly

21. My child(ren) participates in tutoring or other academic activities away from school.

Strongly Agree Agree Undecided Disagree Disagree Strongly

22. I know how to help my child track his or her progress toward a goal.

Strongly Agree Agree Undecided Disagree Disagree Strongly

23. I do not feel a sense of belonging to my child's school.

Strongly Agree Agree Undecided Disagree Disagree Strongly

24. I am confident talking to my child about his or her progress in school.

Strongly Agree Agree Undecided Disagree Disagree Strongly

25. I am comfortable taking my child to visit a museum.

Strongly Agree Agree Undecided Disagree Disagree Strongly

Please indicate if you agree or disagree with the following statements for #26 – 33.
Yes No I don't know

26. Board games or card games are available for my child to play with at home.

Yes No I don't know

27. I play math-related games and activities with my child.

Yes No I don't know

28. There is a set place at home for my child to do homework.

Yes No I don't know

29. There are books, magazines or videos with math ideas or themes in my home.

Yes No I don't know

30. Have you read the monthly Math Lab Newsletter?

Yes No I don't know

31. The information in the Math Lab Newsletters increased my knowledge about how to support my child's math learning.

Yes No Does not apply to me

32. Did you try any of the activities or math-themed children's books highlighted in the Math Lab newsletters?

Yes No Does not apply to me

33. Are you willing to participate in a focus group to share more of your thoughts about math learning with the Math Lab teacher? If yes, please provide your email or phone number.

Yes No I don't know

Appendix D

Focus Group Newsletter Satisfaction Survey

Math Lab Newsletter Layout & Content

Directions: Please respond to the following statements.

1. What is your overall satisfaction with the newsletter?

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

2. Please rate your satisfaction with the following features of this newsletter.

Length

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Content

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Layout

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Images

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

3. How relevant do you find the information in the newsletter?

Very relevant • Somewhat relevant • Not at all relevant

4. Please rate your satisfaction with the following parts of the newsletter.

Newsletter Introduction

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

#4 Continued: Please rate your satisfaction with the following parts of the newsletter.

Interesting Dates & Facts

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Math-Themed Books

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Hands-on Math Activities

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Words to Know

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Helpful Tips

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Math Jokes

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

Quotes

Very dissatisfied • Somewhat dissatisfied • Neutral • Somewhat satisfied • Very satisfied

This is the end of the survey. Thank you for participating in this research

Appendix E

Parent Focus Group Discussion Questions

Questions to pose:

1. What words do you associate with mathematics? / ¿Qué palabras asocias con las matemáticas?

Finish this sentence / Completa esta oración:

2. To be good in math you need to _____ / Para ser bueno en matemáticas, necesitas ...

3. How do you prepare your children to do well in math? / ¿Qué hace usted para preparar a su hijo para que le vaya bien en matemáticas?

4. Do you believe that intelligence can be developed? / ¿Crees que la inteligencia puede ser desarrollada?

5. What could the school do to help you engage in informal math learning at home or outside of school? / ¿Qué ha hecho la escuela para alentarlo a participar en actividades de aprendizaje de matemáticas con su hijo en casa o fuera de la escuela?

Questions to pose:

1. Did the math newsletters help increase your knowledge of how to support math learning? / ¿Los boletines de matemáticas ayudaron a aumentar su conocimiento de cómo apoyar el aprendizaje de las matemáticas?

2. Is the math newsletter a useful resource for parents and caregivers? / ¿Es el boletín de matemáticas un recurso útil para padres y cuidadores?

3. Did the math newsletter provide you with new information related to how children learn? /¿El boletín de matemáticas le proporcionó nueva información relacionada con cómo aprenden los niños?

4. Should the school continue to provide the math newsletter to parents and caregivers? / ¿Debería la escuela continuar proporcionando el boletín de matemáticas a los padres y cuidadores?

IRB Approval Letter

UNIVERSITY of HOUSTON

DIVISION OF RESEARCH
Institutional Review Boards

APPROVAL OF SUBMISSION

March 16, 2020

Maxie Hollingsworth

mhollingsworth-latimer@uh.edu

Dear Maxie Hollingsworth:

On March 16, 2020, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Purposeful School-to-Home Communication: Impact of Instructional Newsletters on Parent Self-Efficacy to Support Mathematics Learning at Home
Investigator:	Maxie Hollingsworth
IRB ID:	STUDY00002064
Funding/ Proposed Funding:	Name: Education
Award ID:	
Award Title:	
IND, IDE, or HDE:	None
Documents Reviewed:	• ICON HRP-503 Full Protocol Title - Maxie Hollingsworth Clarification Header UPDATED March 2020.pdf, Category: IRB Protocol; • HISD Approval, Category: Letters of Cooperation / Permission; • Parent Pre Post-Survey & Focus Group Questions - Hollingsworth.pdf, Category: Study tools (ex: surveys, interview/focus group questions, data collection forms, etc.);
Review Category:	Exempt
Committee Name:	Not Applicable
IRB Coordinator:	Danielle Griffin

The IRB approved the study on March 16, 2020 ; recruitment and procedures detailed within the approved protocol may now be initiated.