


Fall 2018

# The Effect of Family Engagement on Parents' Abilities to Help Their Children with Math

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THE EFFECT OF FAMILY ENGAGEMENT ON PARENTS' ABILITIES TO HELP THEIR  
CHILDREN WITH MATH

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Submitted in partial fulfillment of the requirements for the degree of  
Doctor of Education  
Department of Education Leadership, Management, and Policy

Seton Hall University  
2018


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SETON HALL UNIVERSITY  
COLLEGE OF EDUCATION AND HUMAN SERVICES  
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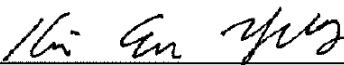
APPROVAL FOR SUCCESSFUL DEFENSE

**Kathleen Ann Kalena**, has successfully defended and made the required modifications to the text of the doctoral dissertation for the **Ed.D.** during this **Fall Semester 2018**.

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## ABSTRACT

The purpose of this study was to ascertain if parents' reported participation in specific math intervention strategies increased their abilities to help their children with math. The five math intervention strategies were Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, HomeworkNOW, Study Island, and Family Math Nights. This research also served to examine if there was an association between parents' participation in the five math intervention strategies and parents' reported demographics. Parents of students in Grades 1 through 5 in a large, urban rim school district were surveyed. Survey respondents encompassed 694 parents. Descriptive statistics were conducted. The math intervention strategy that had the most parent participation was Study Island. Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning were identified as the most helpful. Chi-square analyses were performed to determine if there was an association between whether or not parents participated in each program and the school and grade of the child as well as the parent's gender, race or ethnicity, and marital status. There was a statistically significant association revealed between whether or not parents participated in each of the five math programs and the school the child attends. A statistically significant association was shown between whether or not parents participated in each of the five math programs and the parent's race-ethnicity. Study Island, which had the most parent participation, had the most significant associations.

*Keywords:* parent involvement, family engagement, parent abilities, math, math intervention strategies

## DEDICATION

This project is dedicated to my mother, Patricia Kalena. She has been my greatest cheerleader throughout this experience. She believed in me from the beginning and I am grateful for her unwavering love, support, and encouragement.

## ACKNOWLEDGEMENTS

Throughout this journey, I met wonderfully gifted individuals who will forever hold a special place in my heart. The contacts that I made with talented educators, theorists, and researchers has enriched my life. In the process, I was able to see God's mighty hand at work even through tough times. For that, I thank Him and look forward to where the future leads.

After successfully completing the Ed.S. program at Seton Hall University, I joined Cohort II of the Ed.S. to Ed.D. program headed by a brilliant leader, Dr. Michael Kuchar. Dr. Kuchar has been an inspiration and guiding light. His kind manner, sense of humor, encouraging approach, and genuine interest in the well-being of all students gave me the faith and confidence that I had what it takes: I could do it, and I would do it. He cheered me on all the way. He was always available with wit and wisdom and was a superb mentor. God blessed me with him as my mentor and I am forever appreciative.

The second reader on my committee was Dr. Eunyoung Kim. Dr. Kim is an outstanding educator and quantitative researcher. Without her exceptional knowledge, input, advice, and leadership, this project would not have been the success that it is. She gave a great deal of her time and talents to aid me in this long and demanding process. She was sincerely interested in seeing me succeed. She is an asset to the Seton Hall Community and a true gift from heaven.

Dr. Brian Zychowski is an accomplished leader in education and has been a steadfast support to me throughout this process as my third committee member. He gave of himself to see that I had the best possible dissertation. His devotion to my success in attaining this Ed.D. was continually evident. He was a guiding force in the execution of this study and someone for whom I am eternally grateful.

The confidence I have in my quantitative abilities can be attributed to the exceptional teaching of Dr. Gerard Babo. Through him, I learned I was really good at statistics and I thoroughly enjoyed his classes. He is a one-of-a-kind mathematician and professor who knows how to get students to succeed at difficult processes. I am blessed to have had the opportunity to know him.

Many devoted faculty members and staff of Seton Hall University contributed to the success of my journey toward this degree. I am appreciative of the support and assistance I received from each one. I will always value the role each of them played in my life.

The members from both of my SHU cohorts have contributed greatly to my life. I am so fortunate God led me down this path in life and gave me these remarkable people to walk alongside me in the journey.

I am privileged to have amazing friends and family whose love and support has given me all I need to accomplish my goals. I am now eagerly awaiting the next step God has in store for me as I continue to walk throughout life in the palm of His hands.



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## CHAPTER 1

### INTRODUCTION

#### **Background**

Parents have a substantial influence on their children's education. In the words of Ravitch (2010), "As every educator knows, families are children's first teachers" (p. 239). Education begins at home and carries over to school. The role of a parent can affect a child's academic performance (Sheldon & Epstein, 2005). The success of children at school can be effectuated by the function of family members. Parent involvement in impactful ways throughout the school-age years has long-lasting effects. Myers and Myers (2015) showed that even the instruction of students after high school is influenced by the makeup and engagement of the family unit in school. As parents' recognition of the value of their potential in their children's academic success develops, they may become more actively involved. Myers and Myers (2013) stated that family engagement may escalate when parents become more knowledgeable about the positive effects of their engagement (p. 1). Myers and Myers (2013) also pointed out that educational institutions, along with students, receive positive outcomes when families are engaged (p. 95). The role of families in a child's education cannot be overrated.

It can be beneficial for schools to involve families in a child's education in effective ways. According to Montgomery (2005), most constructive student outcomes are based on dynamic parent-teacher relationships. Dialogue with parents is advantageous to the school and the home. The children profit when the home and school function collaboratively (Montgomery, 2005, pp. 54-55). Having parents involved in educating students can help the child's teachers provide a robust learning environment. Parents can inform educators about important

information related to their child such as propensities, approaches that have been found useful out of school, and so forth, which gives teachers valuable insights to inform their practice in educating the child (Montgomery, 2005). There are many advantages of meaningful engagement of families. For example, Young, Austin, and Growe (2017) asserted, “Parental involvement boosts a child's perceived level of competence and autonomy, offers a sense of security and connectedness, and helps to internalize the value of an education and performance” (p. 291). These findings promote the substantiation of the engagement of family in a child’s life at school.

The U.S. government also recognizes the importance and value of the inclusion of families in schools. Efficacious family participation in schools is required by federal law. According to the law, families conjoining in children’s education is a mandated practice because it is believed to be a valuable contributor to a child’s academic success (Elementary and Secondary Education Act [ESEA], 1965; No Child Left Behind Act [NCLB], 2002; Every Student Succeeds Act [ESSA], 2015). The value of involving the whole family in a child’s education as well as actively committing families to the process is indicated in current school law. The Every Student Succeeds Act of 2015 (ESSA) offers families a chance to have more influence at the local school level and to affect education guidelines established at the state level (Ujifusa & Tully, 2016). The term *parent and family engagement* was substituted for the term *parent involvement* used in previous legislation (Ujifusa & Tully, 2016, “Broader Input,” para. 1). The importance of this change is the recognition that educating a child is a family and community effort.

The government stands behind its goals of providing valuable participation for all families by mandating that schools spend a portion of federal funding received for it. The ESSA mandates that schools maintain the conditions of participation of families by apportioning no less

than 1% of the monies received from Title I toward it (Ujifusa & Tully, 2016). Title I funding secures that every child, regardless of socioeconomic status or living situation, has a “significant opportunity to receive a fair, equitable, and high-quality education, and to close educational achievement gaps” (ESSA, 2015, Sec. 1001 Statement of Purpose). Beyond monetary stipulations, schools are required to develop methods that sustain the prosperous infusion of families. A formal plan for family involvement practice that is “evidence-based” must be secured by districts (Ujifusa & Tully, 2016, “Broader Input,” para. 2). To comply with this condition and reap the benefits of the successful participation of families, schools should access empirical research that supports inclusion of all families in constructive practice.

In an example of this empirical research, Henderson and Mapp (2002) supported family inclusion in schools, indicated the worth of involving families in schools, and discussed how it can be attained by schools. Students’ accomplishments and longevity of school presence are significantly influenced by the involvement of parents, especially those of different social circumstances (Henderson & Mapp, 2002, p. 73). Noted in their analysis of research and studies of successful schools, Henderson and Mapp (2002) claimed the indication that student achievement can increase through parent involvement is clear and mounting. Academic outcomes are also impacted by student conduct and daily presence in school, which are affected by parent involvement (Henderson & Mapp, 2002, p. 73). Thriving parent engagement serves students in many ways. Parents need to be aware of the consequences of their engagement and receive resources from their children’s schools. If academic institutions communicated with families regarding schoolwork and goals and provided families with necessary aid to assist students, every child would prosper (Henderson & Mapp, 2002, p. 73). Strong home and school teamwork is essential. Additionally, engaging families in roles to help children increase abilities



and knowledge in target areas especially in advanced courses, should be pursued by school personnel (Henderson & Mapp, 2002, p. 73). Targeted parent involvement should be encouraged by schools to raise student attainment in academic disciplines. By enlisting parents' input and ideas, sharing the curriculum and educational expectations with parents, and showing them how they can support academic endeavors at home, educators can increase parent efficacy in helping the young scholars learn throughout the school-age years and prepare for post high school years (Henderson & Mapp, 2002). Parents need to be fortified with the knowledge and abilities to help their children excel.

The following research has proven the value of providing parents with information and opportunities to help their children succeed in school. Epstein (2005) showed that children advance academically when teachers involve parents in strategies that support the objectives of the institution. Epstein (2005) reported an increase of children's achievement results in a midwestern academic environment in reading and mathematics by at least 10% as being contributed to by programs such as "Reading-at-Home" and convening every 4 weeks with families (p. 180). Sheldon and Epstein (2005) showed the value of parent involvement, finding that an increase in students' scores in math was related to having given parents valuable information on math and assisting them with interactive math homework once previous math scores were controlled. Children can thrive when parents have resources in math to help them succeed. Epstein and Sheldon (2002) revealed heightened levels of children's daily presence at school correlated with actions that included constructive conversations between the home and school and providing courses for families on the topic. Parent involvement impacts children in other areas that affect academic success, such as attending school. Parents need to be aware of what is going on in school and receive training in how to best aid their children.

Ravitch (2010) stated that even with a well-developed curriculum or plan containing information and competencies children should acquire at each grade level in school, there is a need for family involvement. “Schools do not exist in isolation. . . . Schooling requires the active participation of many” which includes parents (Ravitch, 2010, p. 239). The school district’s curriculum drives the education of the children. The curriculum acts as a guide to apprise school staff, families, and other stakeholders about critical information and abilities needed to be acquired by children at each grade level (Ravitch, 2010, pp. 231, 232, 236). If parents are going to be effectively involved with assisting their children in gaining this information, they need to be aware of the curriculum and have competencies to support the acquisition of the curriculum at home.

### **Evolution of Curriculum in Mathematics**

Over the past few years, the curricula indicating what is being taught and how it is being taught in schools across the United States has taken many turns. All subject areas have been affected by the changing curricula, but the focus of this study was to review the impact of the curriculum changes in mathematics.

Education leaders in New Jersey introduced 16 new math standards through the New Jersey Core Curriculum Content Standards in 1996. This document served to refine mathematics skills to secure prosperity of young scholars in day-to-day life and in future jobs by meeting a set of demanding expectations (New Jersey Core Curriculum Content Standards for Mathematics, 2008). The math curriculum presented in K–12 classrooms advanced to provide for student academic attainment into young adulthood. Creating a national set of standards beginning in kindergarten through the end of high school in the United States for specific subjects including math, the Common Core State Standards were initiated by our nation’s leaders in 2010 (Tienken

& Orlich, 2013). In the broad scope of education, national attention was given to setting up challenging criteria for all American students to attain. With a collection of national benchmarks, students can be taught the same things in every state. This could allow for transiency of students throughout the nation and maintain consistency in their education. In 2015 New Jersey leaders in education once again reviewed the standards for math education and revised them into the New Jersey Student Learning Standards. Getting students ready for the work place and post high school education through an understanding and utilization of mathematical procedures, practices, critical-thinking, and reasoning for proficiency at each grade is the goal (New Jersey Student Learning Standards for Mathematics, n.d.). The ever-changing and increasingly demanding mathematics curriculum is focused on preparing students for post high school education and job attainment. The mathematics curriculum continues to evolve.

Educating students in science, technology, engineering, and math (STEM) to lead to related careers has become a significant national endeavor (Wang, Moore, Roehrig, & Park, 2011, p. 1). The importance of priming students in these fundamentals lies in the path our world is taking. Reeve (2015) stated that to ensure America's standing amongst the many countries around the world in STEM careers, today's youth are being educated in these subjects. Along with STEM, there has been an evolution of computer science in classrooms (Smith, 2016, "Summary," para. 1). Smith (2016) explained that former President Barack Obama introduced the Computer Science for All Program in 2016 with the goal of providing abilities and resources in technical science to all U.S. children. As shown, the mathematics curriculum has undergone several recent significant focal points and revisions. To be internationally adept, American students must be proficient in math. The advancing curricula in mathematics continues to alter American classrooms which, in turn, impacts parents.

The extensive changes in the curriculum of mathematics have had many consequences. Kane, Owens, Marinelli, Thal, and Staiger (2016) reported that the institution of the Common Core State Standards in schools has brought about major transformations in the math curriculum. Researchers at the Center for Education Policy Research at Harvard University surveyed a random sampling of educators in five states to determine how their pedagogical practice changed to meet the demands of the new Common Core State Standards (Kane et al., 2016). Significant alterations in over 50% of the tools used in teaching mathematics was reported by over 80% of the math teachers surveyed. (Kane et al., 2016). From 2013 to 2015, almost half of the teachers reported switching to new math books (Kane et al., 2016). Additionally, over 60% of the educators reported revising the way they teach math (Kane et al., 2016). This has great implications for parent efficacy in math. If teachers are finding drastic alterations in the curriculum of math, parents are experiencing the same. These recent changes have not only influenced pedagogy of educators in mathematics, but have also altered the abilities of parents to stay informed and assist their children with math.

### **Parent Left Ill-Equipped Due to Evolution of Math Curriculum**

The math curriculum has changed so much that parents do not have the capabilities to help their children achieve in mathematics. According to Ginsburg, Rashid, and English-Clarke (2008), these curriculum shifts and a lack of math understanding have left parents feeling inadequate in performing their role. Parents feel inept and are not able to help their children due to the complexities and evolution of the math that is currently being presented in schools. Ginsburg et al. (2008) cited changes in math curriculum in elementary schools as an impediment to parents' ability to assist with related homework and found that parents did not have the competence to assist their children with their academics even though parents had feelings of

accountability for it. Parents wish to help their children to achieve at school but feel unequipped to do so.

The inability of parents to assist their children in math affects parents, children, and teachers. According to Griffin and Galassi (2010), parents credit their children's lack of achievement to their unawareness of ways to assist their children. Parents recognize that they cannot help their children because they are not sure in what manner to assist the students. Therefore, the students are not experiencing optimal academic performance. Wilder (2017) showed that parent efficacy levels in helping their children with math homework decreased after the second grade. Once math gets too complicated for parents, children no longer have that human capital to aid them in math. This decrease in parents' beliefs that they could help their children effectively was related to their own level of education (Wilder, 2017, p. 115). It is thought by educators that one reason parents do not help children at home is because they do not know how to help (Wilder, 2017, p. 108). Parents want children to succeed, but they do not have the skill to guide them. As the emerging changes in education unfold (e.g., curriculum revision in mathematics), teachers need to know that families are committed to foster the acquisition of math skills of all students (Wilder, 2017, p. 116). The best possible tutelage of children in math depends on parents' capabilities to support their education, and schools need to facilitate this channel.

### **Schools Can Help Equip Parents**

Schools should help parents acquire competencies in helping children with math. Bartel (2010) confirmed that equipping Title I families to assist students to learn needs to be conceptualized by educators. Family engagement for Title I students can enhance the educational process. Continuous and productive discussions with educators and students as well

as assisting with schoolwork at home was felt by families to be their job (Bartel, 2010, p. 218). Educators can take advantage of this and help families accomplish these tasks. Parents felt insecure about assisting students in specific academic areas, despite sensing security in assisting the young scholars in attaining success at school (Bartel, 2010, p. 218). Mathematics is a subject that parents need more support in to help them assist their children with math. Goldman and Booker (2009) explained that when self-efficacy of parents is strengthened, there is a greater chance they will work with students to complete math homework (p. 385). Elevating parents' abilities can help them acquire skills to aid their children with math and accelerate student performance in math.

Family engagement in math is essential for students to progress in mathematics. According to Wilder (2017), younger students are particularly impacted by family engagement. School success is dependent on the comprehension of the point of and reason for family engagement (Wilder, 2017, p. 115). Educational institutions should do all they can to equip and secure families to aid their children because families have a bearing on the training of these youth. It is valuable to study parents' educational experiences with their children and how they contribute to school success since in the early years, students are with their parents a great deal (Suizzo, Pahlke, Yarnell, Chen, & Romero, 2014, p. 257). Finding specific math resources that schools can procure for parents to enable them to aid their children in math is essential.

### **Statement of the Problem**

Math and how it is taught in schools is continually evolving and becoming increasingly more complex. Parents no longer have the knowledge and skills they need to help their children succeed in math. Schools need to support, equip, and effectively engage parents in this ever-changing and demanding climate.

Family involvement benefits the home and the school. Empirical research and current school law support that parent engagement is beneficial and vital to the education of the young (Epstein & Sheldon, 2002; ESSA, 2015; Sheldon & Epstein, 2005; Van Voorhis, 2011; Young et al., 2013). Parent involvement is an integral and impactful component of schools. According to Siddiqui (2011), the absence of the engagement of families in students' education negatively impacts students' achievement. Students experience difficulty without effective family engagement. It is quintessential and even mandated by current school law for parents to be involved in their children's education in effectual ways.

However, due to the transformation and complexity of curriculum in mathematics, parents are not adept to become effectively engaged in assisting their children in math. The evolution of mathematics curriculum has left parents ill-equipped in assisting children at home with learning math skills (Ginsburg et al., 2008). Parents are constrained in the assistance they can provide for their children in math. Some parents believe that their children are not achieving because they are not engaged enough (Griffin & Galassi, 2010, "Theme 1: Parent and Family Barriers," para. 2). The advancing requirements of the math curriculum have left parents ineffective in helping their children with mathematics.

Although there are many benefits to parent engagement, research shows that parents feel inadequate to aid their children in mathematics due to the shift in the math curriculum. Parents need to be equipped to guide their children in math. With assistance from schools, parents can achieve their goals of helping their children be successful (Johnson, 1997, p. 1800). Educational institutions should present families with tools to help their young scholars thrive at mathematics.

## **Purpose of the Study**

The purpose of this study was to determine if parents cite that participation in various school-related math intervention strategies was helpful in increasing their ability to help their children with math. Parents were surveyed about their engagement in Everyday Math Online Tools and Games, Family Math Nights, HomeworkNOW, Star Math Reports/Home Connect from Renaissance Learning, and Study Island. The goal of the study was to ascertain if parents report that participation in these math intervention strategies helped increase parents' abilities to assist their children with math in a challenging and ever-changing curriculum. Significant associations were found between parents' participation in the math intervention strategies and some of the parents' reported demographics.

Finding effective activities that give parents the knowledge and skills they need is valuable and necessary. Daniel (2011) indicated the need for finding successful approaches of participation in students' academic life that include all genera of families (p. 171). Daniel (2011) asserted that to support the structure of alliances between the school and home, a wide variety of productive parent engagement strategies need to be documented in empirical studies (Daniel, 2011, p. 174). Therefore, this current study served to determine whether parents found that their participation in various school-related math intervention strategies was productive in increasing their ability to help their children with math.

Schools need to discern which strategies are efficacious and offer them to families. According to the ESSA of 2015, schools must provide "meaningful parent and family involvement" activities for their school community (Section 1010 Parent and Family Engagement [2] subsection a [B] in paragraph 2[i] [III]). This current study revealed activities that parents found meaningful. Input gleaned from parents will provide schools with effective



family engagement opportunities as required by school law (ESSA, 2015 Section 1010 [2] Written Policy [E] [D]). Mandates support the provision of valuable family engagement to equip and inform every parent in the education process.

Effective family engagement is related to positive student outcomes in math (Epstein, 2005; Sheldon & Epstein, 2005). With this knowledge, educators can create opportunities for parents to become more effective in helping their children achieve in math. One way to equip parents to help their children with math is by providing programs for them. Parents need and want to learn mathematics to be able to assist their children with learning math at school (Ginsburg et al., 2008). For these reasons, finding math intervention strategies that enable parents to help their children with math benefits the home and school.

### **Significance of the Study**

This study was conducted to research the effects of family engagement in school-related math intervention strategies as reported by participating parents. Parents stated whether their ability to help their children with math was impacted by their participation in the math intervention strategies. The five math intervention strategies were Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, HomeworkNOW, Study Island, and Family Math Nights. Results show how helpful each program was for participating parents. Findings will be beneficial to schools, families, and future researchers.

This study will provide constructive information to schools. According to the ESSA (2015), any school district receiving \$5,000 or more in Title I aid must apportion no less than 1% of the money toward the involvement of families as defined in the law. Findings of this study will inform and guide local policymakers and school leaders about the competent distribution of this funding and other resources toward specific types of “effective parent and family

involvement” required by the law (ESSA, 2015, Section 1010 [2] Written Policy [E] [D]). With this knowledge, schools can be diligent in expending resources on strategies that were deemed helpful.

According to Johnson (1997), an aspiration of parents is to see their children advance at school and they would like to aid in the process. With assistance from schools, parents can achieve their goal (Johnson, 1997, p. 1800). Through this study, specific school-related math intervention strategies that parents report impact their efficacy in helping their children with math have been uncovered. Siddiqui (2011) stated that student achievement is enhanced as parents engage consistently throughout their children’s school-age years. Parents and children will gain from this research. Parents will learn about math intervention strategies that they can participate in to enable them to help their children. Children will receive the assistance they need to be successful in math.

Researchers will find value in this study. Parent engagement has been encouraged in many published works (Johnson, 1997, p. 1790). Nonetheless, “Even after thirty years of research and experiments, scholars and activists have yet to pinpoint specific practices that a wide variety of schools can replicate successfully” (Johnson, 1997, p. 1790). Future researchers will benefit from the outcomes of this research as it will narrow the field of study on specific strategies that parents report as assets to effective scholarship. Understanding the impact of involvement in specific school-related math intervention strategies noted by parents regarding their competencies in teaching their children math will add to current literature supporting effective family engagement.

### **Overarching Research Questions**

The study was guided by three overarching research questions:

1. Of the five math intervention strategies, which one has the most parent participation?
2. Of the five math intervention strategies, which is identified as the most helpful?
3. Is there an association between parents' participation in the five math intervention strategies and parents' demographics?

More specifically,

- 3a. Is there an association between parents' participation in Everyday Math Online Tools and Games and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3b. Is there an association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3c. Is there an association between parents' participation in the HomeworkNOW Program and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3d. Is there an association between parents' participation in Study Island and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3e. Is there an association between parents' participation in Family Math Nights and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?

### **Research Design and Methodology**

A quantitative approach was appropriate for this study. A survey was sent to parents of elementary school students in Grades 1 through 5 in a large urban rim school district. Through

the survey, parents reported on their participation in the school's math intervention strategies. Math intervention strategies are programs offered by the schools to provide parents with knowledge to help their children succeed in math. The five math intervention strategies were Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, HomeworkNOW, Study Island, and Family Math Nights. The survey was a cross-sectional design, which means it was a one-time survey. Results were analyzed to determine if parents indicated that participating in these activities helped to increase their ability to help their children with math. This research also served to examine if there was an association between parents' participation in the math intervention strategies and parents' reported demographics.

This school district was selected because it is an urban rim school district. An urban rim district is flanked by city and residential settings (Watson, 2011, p. 31). Qualities and features of schools in both residential areas and metropolitan areas are exhibited in urban rim schools. Additionally, this school district offers a variety of math intervention strategies for parents to participate in. As prescribed by current school law, when a school system receives aid in an amount that is more than \$5,000, at least 1% must be used for parent involvement which includes activities that develop abilities of family members (NCLB, 2002, Section 1118 [a] [3] [A]). This school district designates monies toward family involvement practice.

A descriptive analysis was completed. Results showed the frequency and percent of how helpful parents stated that participation was in increasing their ability to assist their child in math and how often parents participated in each strategy. Chi-square analyses were performed to determine if there was an association between whether or not parents participated in each program and the school and grade of the child as well as the parent's gender, race or ethnicity, and marital status. Detailed methodology is thoroughly explained in Chapter 3.

## **Assumptions and Limitations**

### **Assumptions**

The study commenced based on several assumptions. It was assumed that parents receiving the surveys, and not a third party, were the ones completing the surveys. It was assumed that the parents were truthful about the answers they gave on the survey responses. It was assumed that parents being surveyed had access to the math programs being studied. The math intervention strategies offered parents an opportunity to enhance their abilities to help their children with math.

### **Limitations**

A limitation of this research was that it addressed parent involvement in an urban rim community and not a specific rural or city community. It only served to measure participation by parents of students in Grades 1 through 5 in elementary school and not middle or high school. The study did not include measurement of student outcomes. The school is a public school and the researcher did not examine charter or private schools. The results are perceptions reported by parents. Specific backgrounds of parents that could provide challenges for parents such as previous mathematic ability, level of education, socioeconomic status, language, and time constraints were not addressed in this study. There are many math intervention strategies available in the field of education; however, the researcher limited the study to these five math intervention strategies specific to this school district. This study did not involve examination of whether or not specific math curricula have an impact on parent involvement.

### **Definition of Key Terms**

*Parent:* According to the NCLB (2002), the definition for “‘parent’ includes a legal guardian or other person standing in loco parentis (such as a grandparent or stepparent with whom the

child lives, or a person who is legally responsible for the child's welfare)" (Section 9101[31]).

*Family:* According to Daniel (2011), family is defined as "all those sharing responsibility for the care and raising of the child, within parameters of legal responsibilities and parental, custodian or guardian consent" (p. 166).

*Parent Involvement and/or Family Engagement:* Henderson and Mapp (2002) explained that the No Child Left Behind Act outlines family engagement as strategies known to "improve student academic achievement and school performance" (p. 76). Anderson and Minke (2007) noted that what constitutes the engagement of families is perceived differently by teachers and families (p. 311). Young et al. (2013) found that parents' misunderstanding of and decrease in productive participation may be attributed to inconsistencies in the meaning school officials give to the engagement of families. Ice and Hoover-Dempsey (2011) stated that parent involvement "can be generally defined as a parents' investment of resources in their children's education" (p. 345). For this study, parent involvement and/or family engagement was defined as family members of students participating in school-related activities.

*Partnerships:* Epstein et al. (2009) stated "partnership [conveys] that parents, educators, and others in the community share responsibility for students' learning and development" (p. 1). Mapp and Kuttner (2013) described a lens to view affiliations between the educational institution and the family and stated that successful partnership or alliance strategies consist of consortiums through which participants receive and exchange information, ideas, and support. According to Mapp and Kuttner, recently gained competencies can be experimented with, and work toward "empowering and enabling

participants to be confident, active, knowledgeable, and informed stakeholders,” are dependent on bonds of high regard fostered between all parties, and need to be developed with the objective of correlating intentions to support children’s education and the objectives of the educational institution community with parent participation (pp. 9–10).

*Efficacy:* According to Henderson and Mapp (2002) efficacy is “the power to produce an effect” (p. 33). Henderson and Mapp explained that family efficacy comes from feeling confident that they can help their children do well in school and be happy and safe. It also comes from feeling they can overcome negative influences on their children and have a positive impact on the school and neighborhood (Henderson & Mapp, 2002, p. 64).

*Curriculum:* A set of general guidelines about what is taught in schools (Ravitch, 2010).

*Math Intervention Strategies:* Practices the school put in place to provide families with an opportunity to develop competencies in mathematics to help their children succeed in math.

*HomeworkNOW:* A free online, social media vehicle for families to keep abreast of what is happening at the educational institution (HomeworkNOW, 2018). Class pages containing various educational resources, such as schoolwork to be completed at home, video recordings, pictures, announcements, messages, events, and notices from school staff, can be accessed by families (HomeworkNOW, 2018). In addition, educators and administrators can be messaged by families to maintain ongoing dialogue (HomeworkNOW, 2018).

*Study Island:* “Study Island, a division of Edmentum, is a leading subscription-based, software-as-a-service (SaaS) provider of education product” (Study Island, 2017a, para. 1).

Lessons based on the state learning standards are presented in various subjects. Students participate in interactive online activities with instantaneous formative assessments and improvement tutorials for each skillset (Study Island, 2017c). For this study, Study Island referred to the math segment of the program.

*Everyday Math Online Tools and Games:* “Everyday Mathematics is a comprehensive Pre-K through Grade 6 mathematics program engineered for the Common Core State Standards” which was created through the University of Chicago, School Mathematics Project (Everyday Mathematics, 2018a, paras. 1–2). A progression of activities from everyday life are presented to increase students’ mathematical understanding (Everyday Mathematics, 2018a, para. 2). Web-based activities that are entertaining and examinations of performance that are provided instantaneously through “The Student Learning Center” reinforce skills in mathematics (Everyday Mathematics, 2018b), More Engaging For Students, Interactive Digital Experience). Family assistance is also a part of “The Student Learning Center” (Everyday Mathematics, 2018b).

*Star Math Reports/Home Connect from Renaissance Learning:* Progress made by children on Star Math assessments is presented in Star Math Reports (Star Math, 2018b). The reports contain assessment outcomes which are available for family as well as the educational institution access (Star Math, 2018b). Families can utilize Renaissance Home Connect electronically anyplace on or off the school site (Renaissance, n.d.a). Children can complete activities at home or places other than school and vital information can be retrieved by parents (Renaissance, n.d.a). Through Accelerated Math from Renaissance Learning, families have electronic access at home to vital math resources, math lessons,



samples of math problems, child progress, communication from the school, etc.

(Renaissance, n.d.b)

*Family Math Nights*: District-created and teacher-led evening programs to which families of elementary school children are invited to attend to learn about accessing district-supported online tools and other resources in mathematics. This program is different from and totally unrelated to the Family Math Program developed through the EQUALS program at the Lawrence Hall of Science, University of California, Berkeley (Stenmark, Thompson, & Casey, 1986).

*Technology*: “A broad definition of technology is anything that is human made that makes life easier” (Stohlmann, Moore, & Roehrig, 2012, p. 30).

*Urban Rim School Districts*: Having qualities and features of schools in both residential areas and metropolitan areas; schools that are “located right between what most acknowledged as the suburbs and the city” (Watson, 2011, p. 31).

### **Summary of Chapter 1 and Organization of the Study**

The goal of Chapter 1 was to introduce the reader to the topic of parent involvement in schools and how it relates to the current school curriculum. Background information on the importance and benefits of family engagement in school-related activities was presented. School laws mandating effective parent involvement were cited. A historical review of the development and current status of curricula in mathematics was given. Parent response to the curriculum shift or evolution of math curriculum followed. Research indicates parents have been ill-equipped to handle the changes in the mathematics curriculum. How schools are responding to the needs of parents was therefore included as well.

The problem statement was introduced in Chapter 1. Because of the ever-changing and demanding curriculum in math, parents are unable to help their children with math. A lack of awareness and understanding of the mathematics curriculum has left parents ill-equipped in assisting children at home with learning math skills (Ginsburg et al., 2008). Without parents' assistance, the children are having trouble. The absence of family engagement in students' education negatively impacts students' educational experience (Siddiqui, 2011). Evidence showing the lack of math achievement was given in Chapter 1, in addition to research indicating how parents are uninformed about the new math and unable to help their children.

The purpose of the study was communicated in Chapter 1. Parent participation in a large urban rim school system was analyzed to ascertain if parents indicated that involvement in specific math intervention strategies impacted their abilities to help their children with mathematics. The impact the study will have on all stakeholders was presented. The design of the study was described. Chapter 1 closed with a section of key term definitions.

Chapter 2 contains an explanation of the literature search process and a section on inclusion criteria, including information showing a decline in math scores nationwide. The literature review covers the evolution of policies mandating parent and family involvement in schools and impact of those laws as well as empirical research on the topic. The Type 4: Learning at Home section of Epstein's (2011) framework of six types of involvement for comprehensive programs of partnership served as the major conceptual framework guiding the research.

Chapter 3 presents the methodology and design of the study. Chapter 4 is a presentation of the data and findings of the study. Finally, Chapter 5 includes a discussion of the findings and

implications for current practice. Implications and recommendations for policy and practice as well as for further research are discussed.

## CHAPTER 2

### LITERATURE REVIEW

Parent involvement in a child's education is essential for a child to achieve academic success. According to Siddiqui (2011), "Children have two main educators in their lives, their parents and their teachers" (p. 47). Students prosper when these two significant stakeholders interact constructively. When schools "relate to a child's family in a positive, productive manner, the situation is always more beneficial for the child" (Montgomery, 2005, pp. 54–55). There is great value in maintaining a quality, ongoing relationship between educators and families. Our nation's lawmakers concur. Current federal mandates provide for effective communication between families and schools. A focus of school law is requiring parent engagement to increase children's scholarly attainment (Henderson & Mapp, 2002). Schools need to offer parents an opportunity to participate in their child's education and become aware of what information is being taught in school to increase student intellectual excellence. This task is a continuous process as the school curriculum is constantly transforming.

Math and how we teach it is being modified so much that parents do not have the proficiencies to assist their children with this discipline. Changes in what is being taught in mathematics and how skills are being presented in schools is apparent (Kane et al., 2016). Parents are not able to help their children with math because of the evolution of the mathematics curriculum (Ginsburg et al., 2008). Johnson (1997) believed parents and children are on the same team: "Parents want to help their children succeed academically" and with assistance from schools, parents can achieve that goal (p. 1800). Therefore, schools need to sustain parents in this ever-changing and demanding climate.

The focus of this dissertation was to study how family engagement in specific school-related math intervention strategies is reported by parents to have impacted their ability to help their children with math. An investigation into parents' perceptions about their experiences with math intervention strategies determined that the majority of parents stated that the strategies aided them in developing the ability to assist their children with math. The orientation of this chapter begins with the purpose of the study, followed by an explanation of the literature search process. Historical policies mandating parent and family involvement in education and supporting literature ensue. The evolution of curriculum is presented, along with family and school responses. After that, a synthesis of the findings of research on the topic of family participation are presented. Epstein's (2011) framework of six types of involvement for comprehensive programs of partnership's Type 4: Learning at Home was used as the major conceptual framework guiding the study. This framework was chosen because it presents a means to view the essence of effective family engagement in activities at home that impact a child's success at school. The chapter concludes with a summary of the literature review.

### **Literature Search Process**

This literature review was conducted to provide an extensive evaluation of research completed and written on the topic of the effects of family engagement in schools and to present a comprehensive analysis of the findings citing both what works and does not work in family involvement. This information was used to narrow the topic of this study, which was to determine if parents cited that family engagement in specific school-related math intervention strategies positively impacted their ability in helping their children with math. The review of empirical literature and studies presented will guide school leaders in making accurate, informed, and thoughtful decisions regarding parent engagement in order to expend valuable resources

wisely and secure student academic success. Moreover, parents will benefit from having effective strategies in which to participate. Children will gain assistance to attain academic success. This study will give valuable input to future researchers in the area of reported effective family engagement.

Various research methods were employed in conducting this literature review. With the assistance of the Seton Hall University (SHU) School of Education librarians, the SHU Library website on and off campus was accessed. Additionally, a Google search on the Internet was completed, documents in the researcher's personal library were reviewed, and national and specialized organizations and databases such as National Center for Education Statistics (NCES), National Education Association (NEA), National Association of Elementary School Principals, and the National School Public Relations Association were consulted. ProQuest was utilized to obtain published dissertations on related topics. Some articles were accessed through the ILLiad System of SHU inter-library loan and EBSCO. Also, a local public library was used to obtain a copy of a book that was difficult to find (librarians there searched WorldCat and found it). Books, refereed journal articles, publications, and dissertations were read to gain a substantial and thorough review. To offer input from an expert in the field, Dr. Joyce L. Epstein, an internationally prominent theorist and researcher in parent involvement, was contacted via email and phone for her personal advice. Search terms included *parent*, *parents*, *parent involvement*, *parent involvement in elementary school*, *parent engagement*, *parent involvement and student achievement*, *parent efficacy*, *student outcomes*, *family involvement in school*, and *family engagement*. The focus on the literature review began with a wide search including the years 1970 to 2017 to make certain all empirical research, key literature, and studies were included. After reviewing the theoretical viewpoints of founders in the field, the time span was narrowed.

Reference lists of dissertations written on related topics were scanned to access sources of journal articles in order to create an inclusive examination of relevant literature.

### **Inclusion Criteria**

The inclusion criteria for this literature review involved mainly articles, materials, and texts from the United States; however, some were selected from other countries due to their relationship to the topic. Most articles selected were peer-reviewed and all were written in English. Documents on education policy in the United States were included to give perspective on the mandates school systems face. In addition, documented sources such as the Trends in International Mathematics and Science Study (TIMSS), the Scholastic Aptitude Test (SAT), the Partnership for Assessment of Readiness for College and Careers (PARCC), and the National Assessment of Educational Progress (NAEP) showing little or no growth or a decline in math proficiency nationwide were presented.

### **History of Parent Involvement Policy in Education**

Historically, federal laws have incorporated provisions to improve our nation's schools, which includes parent involvement. Expanding parent engagement in schools is the most prevalent of all the innovations our nation's leaders have required (Johnson, 1997, p. 1757). A focal point of school law is the requirement of parent engagement in order to increase children's scholarly success (Henderson & Mapp, 2002). Federal laws continue to provide for efficacious engagement of families.

The ESEA (1965) was signed by President Lyndon B. Johnson to provide American children with a better education. The Act increased the chances for all children to achieve academic success. Schools across the country that had a significant number of parents and students in low socioeconomic situations were provided funding to make certain these students

were provided with quality learning experiences (ESEA, 1965). This law secured opportunities for all students in receiving an excellent education regardless of demographics. Making schools secure parent engagement in their children's education for economically disadvantaged families has been mandated by Title I of this law (Johnson, 1997). The ruling of Title I and its directives for parent engagement continued. Parent participatory roles were further enhanced when this Act was amended by the Improving America's Schools Act of 1994 (IASA; Johnson, 1997). Based on the above, parent engagement is considered a valuable factor and predictor of a student's successful education.

As school laws progressed, parent involvement remained a key component. Domina (2005) pointed out that recent U.S. mandates to improve education have been motivated by the notion that parent involvement is able to alter "children's educational trajectories" ( p. 245). In addition, Domina noted the evolution of federal laws on engaging families from the presidencies of Reagan to G. W. Bush and cited President Reagan's 1986 Goals 2000: Educate America Act as the beginning of a thrust of federal mandates to secure family participation in education (p. 233). Support was guaranteed for parent engagement in schools. The allocation of monies to sustain family engagement initiatives was included in President Clinton's 1996 re-endorsement of the ESEA and continued in the NCLB under President G.W. Bush (Domina, 2005, p. 233). Not only was parent involvement viewed by lawmakers as significant to educational programs, but resources including monetary funding were also put into place to support family engagement.

The NCLB (2002) was signed into law by President G.W. Bush on January 8, 2002. It called for the improvement of educational programs by local education agencies (LEAs; NCLB, 2002). In Section 1118 of the NCLB, there is a provision that parent engagement must be secured by each LEA in order to obtain federal monies. The government is supplying necessary



money to support the initiatives they are mandating for family engagement in schools. If a district receives more than \$5,000 in federal aid, at least 1% must be used for family engagement strategies as defined in the statute, including developing abilities in members of families (NCLB, 2002, Section 1118 [a] [3] [A]). Through the NCLB (2002), not only must districts set aside money for this initiative, but families must also be included in the organization of the practice in the district, have access to necessary resources, and maintain essential communication in parents' native language between the home and school. There is a provision for making certain parents comprehend the educational program and what is required of their children as well as the occasions they have to get engaged. There is a desire to see families included in the creation and execution of the techniques to engage families in their children's education. To secure the scholarly success of students, families must be given resources to develop their abilities to assist students (NCLB, 2002, Section 1118 [e] [2]). Information on the scholarly expectations of students and testing procedures must be presented to families (NCLB, 2002, Section 1118). To optimize children's success at school, LEAs are responsible to craft and maintain effectual methods of family engagement. Indications of a commitment to parent involvement in the education process are contained in the NCLB (Henderson & Mapp, 2002). The current school law follows suit with former laws and further improves the family involvement component of federal law to provide for student scholarship at school.

On December 10, 2015, President Obama signed into law the ESSA, which enhanced the NCLB (2002). In this new Act, which is the current education law, the president made several changes to benefit families and promote young scholars' success at school. The term *Parental Involvement* was changed to *Parent and Family Engagement* (ESSA, 2015, Section 1010). This all-encompassing term gives evidence to the value seen in involving the whole family in a

child's education. Each LEA is called to involve all families and provide "meaningful" opportunities for engagement (ESSA, 2015, Section 1010, Parent and Family Engagement [2], subsection a [B], para. 2[i] [III]). As in the NCLB (2002), the ESSA (2015) stipulated that the district proposal for parent engagement strategies must be created with the assistance of the families (Section 1010 Parent and Family Engagement [2], subsection a [B], para. 2[i] [III] [ii] [A]). The active involvement of families in leadership capacities is mandated through the ESSA and LEAs are responsible to seek expertise from outside agencies to secure successful family engagement to improve student outcomes (Section 1010 Parent and Family Engagement [2], subsection a [B], para. 2[i] [III] [ii] [B]). Schools can provide the scholarly parent involvement called for in the law with help from other agencies. The effectual involvement of all families despite possible hindrances such as limited knowledge of the English language, socioeconomic status, and parent education should be procured (ESSA, 2015, Section 1010 Parent and Family Engagement [2], subsection a [B], para. 2[i] [III] [ii] [B] [D] [i]). The outcomes of the involvement of parents are to be assessed yearly and improvements made accordingly (Every Student Succeeds Act, 2015, Section 1010 Parent and Family Engagement [2], subsection a [B], para. 2 [i] [III] [ii] [D] [i] [ii] [iii]). This legislation gives all parents a voice in the education of their children. It is designed to insure that local parent involvement strategies are successful to maintain students' achievement at school.

As in the NCLB (2002), the ESSA (2015) requires that any school district receiving \$5,000 or more in Title I aid must apportion no less than 1% of the money toward the involvement of families as defined in the law (Section 1010 Parent and Family Engagement [A] In General). Consulting with institutions that were prosperous in their parent involvement practices, staff trainings, or resources on parent involvement best practices being distributed, are

among a list of practices from which districts must choose at least one to utilize monies toward (ESSA, 2015, Section 1010 [3] Reservation A In General -D Use of Funds i-v). The use of the parent's native language should be exercised whenever possible in ongoing interactions among educators and the home (ESSA, 2015, Section 1010 Parent and Family Engagement Policy [5] D). In these ways, lawmakers have made family engagement a critical and vital part of the education process of children.

### **Impact of the Laws**

Families do have a voice. Parents are authorized as “full partners in their child’s education” in the NCLB (Manos, 2009, p. 22). The NCLB (2002) provides opportunities for schools to glean the wisdom and guidance from children’s families in their education to increase student growth and development throughout the school-age years. Parents can act as consultants and have direct input into what is being taught in the school (Manos, 2009). Therefore, parents have a direct influence in the education system.

There is some consensus that giving parents specific skills to help students achieve is valuable in bridging economic and academic gaps. Johnson (1997) declared that promoting opportunities for parents with a low socioeconomic status to learn specifically how to help their children succeed should be a facet of Title I (p. 1757). The acknowledgement that parent engagement can improve student outcomes and “was a viable solution to educational inequities” was indicated when the government mandated parent involvement practices (Johnson, 1997, p. 1759). Schools can help to develop competencies in parents to furnish their necessities and undergird student accomplishments through parent engagement. Johnson (1997) showed that parents need support to fulfill their desire to assist their children to learn (p. 1761). Educational outcomes are advanced by parent engagement for low-income families (Johnson, 1997). With

intercession from schools, all parents can be actively immersed in refining the scholarship of their children.

It is essential that schools find strategies that efficaciously prepare parents in their roles to help increase scholarly accomplishments of their children. Shaver and Walls (1998) maintained that parent engagement activities that impact child outcomes must be determined in order to allocate funding judiciously. Productive strategies that employ family participation in the education process are needed. Shaver and Walls found that children in the Title I program experienced increased outcomes in math and reading when their families were present at educational programs at school (p. 94). Increasing the presence of all families can insure elevated degrees of intellectual progress for children. Parent classes are valuable assets to families. Through educational courses, resources were distributed to families as well as aid bestowed in helping their children learn math and language arts at home (Shaver & Walls, 1998, p. 92). Shaver and Walls's study gives credence to the success of planned engagement of families through the Title I program and increased student scholarship.

Each and every parent is valuable to education. Some improvements noted in the NCLB focused on including every parent in the education process and giving parents management duties (Epstein, 2005). Every parent must be pursued to be involved in their child's education. Epstein (2005) cited schools that have had success in putting the intentions of the NCLB into practice toward reaching parents, even those of different backgrounds. The amount and type of resources and events have been increased by school administrators in Seattle, Washington, to involve their wide-ranging group of parents (Epstein, 2005). The school made a concerted effort to incorporate and apprise all parents. This involved multiple languages being used in documents and meetings (Epstein, 2005). Efforts to encompass every parent contributed to

academic achievement. Epstein (2005) also referred to an increase of children's achievement results in reading and mathematics by at least 10% in St. Paul, Minnesota, as being influenced by parent participation in events supporting academic objectives such as "Reading-at-Home" and meeting every 4 weeks with families (p. 180). To amplify the academic achievement of children, greater family engagement can be achieved (Epstein, 2005). When each and every parent is involved in significant ways, positive things can happen at school.

Parent involvement must be consequential. Hoang (2010) stated that to advance math, science, and reading achievement in children, the NCLB provides for initiatives, including substantial parent participation and communication to affect learning outcomes. Hoang called for more collaboration between stakeholders: "Schools, families, and communities are important contexts for children's learning, and that greater coordination among these environments benefits children's education and development" ("Background of the Study," para. 1). According to Hoang, many educational institutions lack successful collaborative affiliations between the home and school, even though they include some participation for parents. Schools need to evaluate their family engagement strategies and look for ways to create fruitful opportunities for family participation.

It is equally important to make certain all students have the chance to succeed through home and school activities. Mapp and Kuttner (2013) viewed the advancement of academic success for every student as the result of the influx of mandates fostering the involvement of parents in schools (p. 5). The purpose and aim of current school law is to provide optimum learning situations for every student. The problem is that there has not been education for those responsible for creating and maintaining the involvement program efficiently (Mapp & Kuttner, 2013, pp. 5–6). Many teachers and parents lack the experience, know-how, and means to form

affiliations that prevail. Mapp and Kuttner outlined a lens with which to view valuable operational affiliations between the educational institution and the family. After examining research studies, Mapp and Kuttner created a detailed system for schools to consult to build opportunities to develop partnerships that last. They created the dual capacity-building framework for family-school partnerships, which takes into consideration the requirements of developing strong associations between the educational institution and families (Mapp & Kuttner, 2013). Productive partnership strategies consist of consortiums through which participants receive and exchange information, ideas, and support; and experiment with recently gained competencies (Mapp & Kuttner, 2013, pp. 9–10). Teamwork in groups secures the occasions for effectual transfer and retention of knowledge. There is a goal of “empowering and enabling participants to be confident, active, knowledgeable, and informed stakeholders” (Mapp & Kuttner, 2013, p. 9). All involved parties must be aware and able to act with assurance. Bonds of high regard and confidence are necessary between all parties (Mapp & Kuttner, 2013, p. 9). Continuous exchange amongst involved individuals demonstrating the value of each person is essential. The program needs to be developed with the objective of correlating intentions to support children’s education and the objectives of the educational institution community with parent participation (Mapp & Kuttner, 2013, p. 9). These pursuits need to be backed by employees in the district. Financial commitment from school leaders is essential for ongoing success (Mapp & Kuttner, 2013, p. 10). Directors play a crucial role in maintaining alliances that are effectual. Home and school affiliations made up of actively involved parents of all genera who promote academic success and self-confidence in students and exemplify “the concept of lifelong learning” as well as informed, supportive, school personnel who create involvement opportunities in an atmosphere of warmth and appreciation for parents will prevail

(Mapp & Kuttner, 2013, p. 11). Organizing efficacious home and school associations can secure parent involvement that can help increase students' accomplishments in schoolwork while making parents become educated and appreciated.

Schools have room to grow in providing effective family engagement. Bartel (2010) reported that many schools do not utilize parent involvement to its fullest capacity, and stated, "Efforts to involve parents are more frequently superficial than examples of true power sharing" (p. 210). It seems that many of the parent involvement programs do not always actively incorporate effective parent involvement. Bartel continued to say that premises of providing funding just when families participate in activities as mandated in the NCLB and Title I "almost seem farcical" (p. 210). Parent involvement needs to be rich and impactful, and not just something schools say they are doing to align with the school mandates. Schools need to find out what effective parent involvement strategies are and incorporate these practices. This can increase parents' abilities to help their children succeed.

Other studies support this premise. Jones (2011) pointed out that a limitation in the NCLB is little consideration for situations that prevent family engagement from being successful, such as a lack of appropriate, welcoming initiatives from the school toward parents and parents not having knowledge, training, assistance, or economic resources necessary for effectual participation (p. 421). It is important for parents to feel they are appreciated at school. Parents have requisites to be met before they can be flourishing contributors in the education process.

Support for the idea that not all schools are doing family engagement well can be found in Griffin and Galassi (2010). In a rural middle school, Griffin and Galassi studied parents of seventh graders and their perceived hindrances of school achievement. Parents cited "a lack of

communication between teachers and parents as a major barrier that prevents academic success of children” (Griffin & Galassi, 2010, “Theme 3: Parent-Teacher Interaction Barriers,” para. 1). Families need guidance from classroom educators in ways they can assist their children with the coursework. Griffin and Galassi found that parents were uncertain and unknowledgeable about the level of engagement they should have in providing their children help with schoolwork. It is important for schools to find out what their parents require to become active contributors to their child’s tutelage and provide it. Schools can offer intervention strategies for parents that give them the means to aid their children with classwork.

Finding specific strategies that help parents gain proficiencies to assist their children is essential. In a case study of efforts to advance parent engagement in a Title I pre-K through sixth grade school, Bartel (2010) found that parents’ abilities in impacting children’s education showed improvement after participating in collaborative schoolwork completed at home and attending parent workshops. The collaborative tasks at home were modeled after the Teachers Involve Parents in Schoolwork program from the Johns Hopkins University’s National Network of Partnership Schools, but with some revisions (Bartel, 2010). Improvements noted throughout the study offer academic institutions new ideas to review to inform effective family engagement even though they cannot be directly correlated to the engagement of parents in the collaborative assignments and courses for families because of outside uncontrolled influences in childrearing and family involvement (Bartel, 2010, p. 218). The results are worthy of consideration for schools looking to advance school success and family engagement. Post interviews conducted a year after the interventions were put into place indicated a decline in parents knowing ways to impact their children’s learning, but an improvement in believing that they could (Bartel, 2010, pp. 213–214). According to Bartel, parents saw their potential in helping their children succeed,



but were unsure of how to accomplish it. Creating supervisory roles and policy determining capacities for parents showed the greatest progress (Bartel, 2010, p. 215).

Bartel (2010) found that student math success was positively impacted. Students' math scores before and after the interventions showed an average increase of 9 points in Grades 3 through 6 (Bartel, 2010, p. 217). This increase in math scores was noteworthy. However, an issue came to light that some parents were not able to assist students adequately with assignments given to complete at home because they were not familiar with the material, even though most reported being willing and available to assist (Bartel, 2010, p. 218). These parents struggled because they were unfamiliar with the content of what their children were learning at school. Parents need to know they possess specific knowledge and skills to help their children. Family engagement is impacted by views of their abilities and responsibilities of involvement (Bartel, 2010, p. 220). Schools can affect parents' capacities and insights in helping their children learn in order to secure engagement from all parents. Parents need support in their roles as parents. An apposite finding of Bartel's indicated relatively no difference between families in Title I parents' results of home indicators and families not in Title I (p. 220). This shows that all parents can become effectively involved given the right training, resources, and opportunities.

Families need to be cognizant of and familiar with school directives and the rewards of effective family engagement. Lavery (2016) found a limited understanding among a cross-section of parents as to the mandates of the NCLB in general and of how it related to their school. This may impede the full impact of the intentions of the legislation (Lavery, 2016). Deficits in proper education regarding the laws can affect the desired effects. If the intentions of the law are to be upheld, all parents need to be fully advised of it and schools must adhere to the precepts. According to national statistics, all parents are not involved in their child's education

(Noel, Stark, & Redford, 2013). This is counter to what is expected in the law. The intentions of the NCLB are for all parents to be productively involved in their children's education. Schools can take an active, efficient role in apprising all parents of the expectations and benefits of their sharing in their child's education and providing efficacious participation of families as required by federal law.

### **Empirical Research on Family Engagement**

Not only does the government recognize the importance of and need for family engagement in schools, there are implications in empirical research. Many types of family engagement are supported in research studies (Johnson, 1997, p. 1790). Students are more effectual at educational institutions when their families are actively employed. A correlation between parent involvement and a child's school success has been shown (Henderson & Mapp, 2002; Sheldon & Epstein, 2005). Research shows the merits of efficacious engagement of families.

The impact families have on their children has been seen over time. According to Henderson and Mapp (2002), throughout a child's educational experience and into adulthood, parents have a significant impact. Henderson and Mapp completed their fourth analysis of research with 51 studies mostly from 1995–2002 on family engagement and school success. Since their first analysis 20 years prior, there had been continued evidence that students' academic success is impacted by family engagement (Henderson & Mapp, 2002). Henderson and Mapp had substantiation of the relationship between parent inclusion and several school attainments of children. Increased assessment results and scores, partaking in advanced classes, maintaining good attendance, exhibition of proper conduct, and progressing through high school and into college, were characteristic of children of engaged parents (Henderson & Mapp, 2002).

Henderson and Mapp indicated that the more a parent is involved, the greater the rewards. Parent involvement at school and at home are both invaluable, with higher levels of parent engagement being more advantageous (Henderson & Mapp, 2002). Schools can capitalize on these findings.

Henderson and Mapp (2002) suggested that to close the achievement gap, an effective practice for educators to employ is engaging all families frequently (p. 7). This indication is for all parents, regardless of demographic characteristics. In classrooms, more time is spent by average Caucasian parents, yet research shows that at home parents of all races and backgrounds are involved with the students' education (Henderson & Mapp, 2002). "When schools, families, and community groups work together to support learning, children tend to do better in school, stay in school longer, and like school more" (Henderson & Mapp, 2002, p. 7). The worth of parent involvement in the greater picture is evidenced as well as in particular scholarly areas.

Henderson and Mapp (2002) cited school practices that positively impact students' math and reading scores. These include providing programs that give families resources and instruction on their utilization in securing student mathematics and literacy success and the act of individual educators making contact with parents (Henderson & Mapp, 2002). Children's scholarship increases when schools invite parents to participate and furnish them with abilities to help their children in intellectual disciplines. Children advance more academically when involvement relates to giving skills and resources to parents on how to better their children's acquisition of necessary information (Henderson & Mapp, 2002, p. 8). The plusses of involving families in certain skill areas as well as generally throughout life have been validated.

Parent involvement is a constant source of promotion for children in many areas. Siddiqui (2011) equated parent involvement with a waterway, stating that one can divert the

direction of a large stream by throwing a stone in it just as families can impact students' lives with their input. Family engagement has great potential for children in all areas of being. A student strives without direction which negatively impacts the child if parental influence is taken away (Siddiqui, 2011). From the start, schools need to educate parents to become advocates for students' scholarship to uphold the affirmative consequences of parental reinforcement. Siddiqui (2011) stated that the greatest impact in children's academic progress is related to early engagement of parents (p. 43). Schools need to immediately get parents immersed at the inception of the child into school. The manners in which schools attract parents should not be overlooked. "The most effective forms of parent involvement are those which engage parents in working directly with their children on learning activities at home and in shaping their personalities" (Siddiqui, 2011, p. 43). By commencing to captivate parents in the primary grades to aid young scholars with schoolwork, schools can make compelling advancements on children's academic success and their aptitude for scholarship.

Parents impact students' conduct which, in turn, affects student achievement. Specific avenues for family engagement affect a child's performance. "Parents prevent children's behavior problems when they volunteer at school, help their children with their homework, and check their children's homework" (Domina, 2005, p. 245). This is valuable to know because children's conduct has ramifications. Domina (2005) asserted that the conduct of children may impact achievement as they move from grade level to grade level. Schools can arrange for certain types of family engagement that increase positive student behaviors which will, in turn, advance a child's scholastic attainment. The engagement of families has a range of positive effects.

Research links effective family engagement with attendance in educational institutions. Epstein and Sheldon (2002) found key forms of engagement that improved children's day-to-day presence at school (p. 308). Among parent, school, and community activities that enhanced children's presence in elementary schools, were constructive conversations between the school and home and providing information through family trainings regarding the issue (Epstein & Sheldon, 2002, p. 315). Schools can arrange participation of families in ways that have been proven to positively bolster the objectives of the school.

Those in charge of schools can increase family participation which enhances outcomes for students. Securing and maintaining successful family engagement is a role of the principal (Young et al., 2013, p. 293). The way directors of schools think about family engagement makes a difference. Through a qualitative analysis of a national sample of about 50 administrators, Young et al. (2013) studied school leaders' descriptions of the engagement of families. Connections between the home and school, family awareness, vigorous involvement, and promotion of the school by families, were recurring themes in definitions (Young et al., 2013, p. 294). Inconsistent meanings and anticipations between the home and school of what family engagement denotes and what it should be can impact participation levels. Young et al. (2013) cited discrepancies that contribute to parents' lower participation rate. Parents being unaware of how to assist their youngsters with school work, not being emboldened to participate, and variances in the meaning of family engagement comprise those discrepancies (Young et al., 2013, p. 292). Parents and school staff should agree about expectancies of participation of families. School employees should be compelled to give parents data and services to help their children succeed. Parents need assistance, occasions, and materials from schools. Young et al. (2013) concluded that the home and school need to jointly determine a meaning of family

engagement while incorporating families in the management of family participation practice to increase and improve participation and advocacy in their schools (Young et al., 2013, p. 295). Family engagement should be delineated and consistently expectant throughout a child's educational process. Administrators are essential to the parent engagement process and should utilize various means to involve all families at school (Young et al., 2013, p. 293). There is a plethora of ways heads of schools can nurture family engagement to effectuate parents to become involved for the betterment of their children and the school as a whole.

Determining what makes parents decide to get engaged at school can be an asset to educational leaders. Anderson and Minke (2007) offered insight and focused on understanding parents' determinations to become engaged in the learning of children. Through a quantitative study of over 350 families in three of the 185 pre-Kindergarten to fifth grade educational institutions in an urban setting, the single most influential variable on the engagement of parents was personal requests from educators (Anderson & Minke, 2007, p. 314). The value of special attention from the child's instructor toward parents cannot be underestimated. In addition, results indicated engagement at school was much less predominant than engagement of parents in their households (Anderson & Minke, 2007, pp. 317–318). Families were more involved in their residences than at the educational institutions, but in general, educators may not know this. If educators are judging engagement of families through a lens of common endeavors taken part in at school, they can miss a plethora of other family engagement actions which they do not see (Anderson & Minke, 2007, p. 318). This invites educators to consider that many parents are truly interested in helping their children with school work at home. Effective parent engagement can be expected at home and school.

Involving families at home and school in specific subject areas such as mathematics has benefits. Sheldon and Epstein (2005) completed a study of longitudinal information on the relationship between children's success in math and parents being involved in math-related initiatives. An increase in children's scores on math assessments was related to parents receiving valuable information on math and participating with their children in collaborative, communication-based math work done at home (Sheldon & Epstein, 2005). Many parents need assistance from the school to perform their roles to promote a child's math achievement. Sheldon and Epstein (2005) explained that by giving parents information on math and encouraging them to help and communicate with their children in mathematics especially at their houses, schools are successful in raising students' success in math. As parents were given information about math and encouraged to actively engage in helping their children with math at home, the students became more successful in math and performed better at school.

Although it has been evidenced that parent involvement has impacted student achievement, literature that points to alternate findings can be found. Fan and Chen (2001) proposed conflicts in empirical research on the impact of parent involvement on student academic success. They cited a lack of an appropriate lens to view the research and inconsistent explanations of family engagement and measurements of school success as impediments to dependable study results (Fan & Chen, 2001). Fan and Chen's research demonstrates a magnification of the topic. In a meta-analysis of 25 quantitative research reports in 2001 on the impact of family engagement on student academic success, Fan and Chen found conflicts in the degree of the beneficial impact of family engagement on school success. They established that when school success was measured by composite scores, rather than by individual disciplines, a more powerful effect was apparent (Fan & Chen, 2001). In addition, parent anticipations of their

children had more promise than guidance in the house. A greater correlation was found between school success and family goals than in students being guided in their household (Fan & Chen, 2001, p. 13). The value of family ambitions should not be overlooked. Bui and Rush (2016) concurred with the value of high parental anticipations. In their study of eighth grade students and their families, based on parents' degrees of schooling, Bui and Rush found parents who had high aspirations for their children connected with their children going to a 4-year university. Family prospects have influence over a child's higher education. A child's enrollment in a 4-year higher education institution was impacted the most by high parent anticipations and the least by family communication with the school and monitoring students in their homes (Bui & Rush, 2016, p. 481). Parents' hopes and beliefs for their children influence their children's higher education.

Domina (2005) also stated there are diverse findings of parent engagement on students' school success and reported that there are varied results from previous research on the impact of family engagement. The conclusions may have been related to which student variables and which activities of family engagement were measured as well as which population of families was studied (Domina, 2005). Domina stipulated that the kind of parent engagement matters. Domina (2005) examined data from the National Longitudinal Survey of Youth 1979 (NLSY79) of almost 1,500 students who were up to Grade 4 in 1996. The NLSY79's Peabody Individual Achievement Test (PIAT) and the Behavior Problems Index (BPI) were administered to these students in 1996 and again 4 years later. He compared the test results of students in the year 2000 with six areas of engagement of families in 1996. "Attending parent-teacher conferences and PTA meetings, volunteering both in and out of the classroom, and checking homework" were kinds of participation initially found to be connected to student school success (Domina,



2005, p. 240). When controlling for “race, family background, and school sector” less of the activities were positively correlated to student achievement (Domina, 2005, p. 240). When controlling the 1996 PIAT scores of students, none of the activities remained positively related to school success (Domina, 2005, p. 242). The result of this study “substantially challenges the notion that parental involvement boosts children’s academic achievement” (Domina, 2005, p. 242). Observations in this research led to a lack of support for the prospect that all parent engagement endeavors are significantly related to student growth and achievement.

Research shows that parent involvement can impact some areas and not others. El Nokali, Bachman, and Votruba-Drzal (2010) focused on how students’ conduct, abilities to get along with others, and academic success were impacted by family engagement. More than a child’s academic performance was studied in relation to parent participation. According to El Nokali et al., it is difficult to relate family engagement to student academic outcomes (p. 990). Figuring out what facets of engagement have influence on young scholars is complicated. It is hard to establish what effects on students can be attributed to the disparities between the individualities of the parents and the degrees to which they are engaged or the participation of the families (El Nokali et al., 2010, p. 990). These researchers sought to find answers through the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD), a “longitudinal, multi-method study of 1,364 children and their primary caregivers” (NICHD Early Child Care Research Network [ECCRN] as cited in El Nokali et al., 2010, p. 991). El Nokali et al. (2010) examined information gleaned from this study regarding students, families, and educators in Grades 1, 3, and 5. Reported family engagement at three grade levels of students was reviewed. El Nokali et al. found no correlation between family engagement and academic advancement, but they did find improved conduct in

children and in their abilities to get along with others (p. 1001). This research did not indicate a direct impact of the participation of families on a child's scholarly advancement, but it did affect student conduct and competencies in relating to others. It was speculated that social and behavioral issues were dealt with and improved because of the increased communication between educators and families acquired through the increased engagement of families (El Nokali et al., 2010, pp. 1002–1003). This study indicated no significant correlation between student scholarly success and family participation, but El Nokali et al. did find family participation heightened students' abilities to get along with others as well as their comportment.

Another study supports research that shows no significant relationship between parent participation through volunteering and subject specific math achievement. Okpala, Okpala, and Smith (2001) looked at the relationship between fourth grade children's progress in math and the engagement of families. In a study of over 4,000 children in Grade 4 from approximately 40 elementary schools in a low socioeconomic area in North Carolina, no significant correlation was found between accomplishments in math and time spent volunteering at the educational institution by families (Okpala et al., 2001). The restrictions of this study can be argued. Selecting only fourth grade students in one low-income area could have impacted the findings (Okpala et al., 2001). Looking at the participation activity of family volunteering also has confines in that there are many grounds for willing and interested parents not being able to participate. There are various bases for the young scholars' attainment in math not being swayed by participation of families. One such cause is parents who are not able to assist their children in math.

Math and how it is taught in schools is continually being modified and, therefore, many parents cannot keep up with the skills needed to support their children at home. As the

curriculum in math is continuously transforming in schools, parents are further handicapped in remaining a positive resource in assisting their children to learn math. These curriculum shifts and lack of awareness and understanding of the math have left parents feeling inadequate in performing their role (Ginsburg et al., 2008). The fluctuating math curriculum and lack of appropriate parent preparation is responsible for parents not being able to aid their children with school math.

### **Evolution of Mathematics Curriculum**

The math curricula presented in U.S. schools has been evolving for some time. From 1890 to 1920, education in the United States was influenced by the progressive movement and famous leader American philosopher John J. Dewey (Hall, 2007-2018). The direction of how students experienced learning was changing. The active participation of children in acquiring knowledge and utilization of “critical thinking and problem-solving” were emphasized during that era (Hall, 2007-2018, “Sep 4, 1890”). Those strategies are being incorporated in the education of math today, almost 100 years later. In a discussion of the history of math education, Woodward (2004) shared a 1947 account by John Roy Steelman: This “presidential report, ‘Manpower for Research’” called for the development of additional scientific and mechanically trained professionals through curricula of math in high schools (p. 17). A math curriculum that better equipped students for a line of work in math and technology was desired. There was also distress amongst higher education institutions that the young scholars were arriving unprepared for the demand of the college math programs (Woodward, 2004, p. 17). Better preparation of students’ aptitudes in math was desired at the school-age level. Students were compelled to acquire more capabilities in math in order to be successful beyond high school.

With the Soviet sendoff in 1957 of their satellite, Sputnik, attention in the United States was focused on enhancing the math and science curricula in American schools (Tienken & Orlich, 2013). There was an interest in making certain that students in the United States were keeping up with students in other countries in the math and science fields. To secure the successful global position of America, the development of mathematicians and effective educators of arithmetic was advocated through increased monetary support from the government (Woodward, 2004, p. 17). To achieve their goal of global competitiveness, American leaders provided monetary support. Preparing younger students with an astute nonconcrete understanding of arithmetical thinking of “new math,” was the focus in the next two decades (Woodward, 2004, p. 17). Intricate math commenced at lower grade levels. Following that time period, a thrust to focus on the three Rs was advocated in “the back-to-the-basics movement of the 1970s” (Woodward, 2004, p. 18). Concentrated education in these three subjects ensued. The math curriculum evolved into applying concepts to unravel mathematical challenges in the 1980s (Woodward, 2004, p. 20). It is apparent that since 1890 the direction of math scholarship and the content of math curricula have taken many turns. For almost 100 years, what was being stipulated in math in American schools and how it was being delivered changed often.

New math standards were introduced by New Jersey leaders in education in 1996 through the New Jersey Core Curriculum Content Standards. These demanding expectancies refined mathematics skills even further. To secure the achievement of young scholars in their day-to-day lives and in future jobs was the intention (New Jersey Core Curriculum, 2008). The standards defined what the children needed to know in math by the end of high school (New Jersey Core Curriculum, 2008). To create a national collection of standards beginning in kindergarten through the end of high school in the United States for specific subjects including

math, the Common Core State Standards were initiated by our nation's leaders in 2010 (Tienken & Orlich, 2013). In 2015, the standards for math education in New Jersey were changed once again into the New Jersey Student Learning Standards. Specifying the utilization of mathematical procedures, practices, critical-thinking, and reasoning for proficiency at each grade, students were readied for the workplace and post high school education (New Jersey Student Learning Standards for Mathematics, n.d.). From the late 1800s until today, the math being presented in schools has shifted significantly and so has instructional practice in math.

The ever-changing curricula in math is responsible for considerable adjustments in educational procedures in American schools. This includes the math tools that were being utilized. Researchers at the Center for Education Policy Research at Harvard University surveyed a random sampling of educators in five states to determine how their pedagogical practice had changed to meet the demands of the new Common Core State Standards (Kane et al., 2016). Serious overhauls occurred in math education. The modification of more than 50% of math resources utilized in teaching math was reported by over 80% of the math teachers surveyed (Kane et al., 2016). About 100% was modified by more than 30% of math instructors (Kane et al., 2016). Over 60% of the surveyed teachers state they modified the way they teach math (Kane et al., 2016). This shows the drastic alteration of math education across the United States. Within 2 years, almost half of the classroom educators reported converting to new math books (Kane et al., 2016). That means students in these classes, which represent almost 50% of the sample population, had to move to alternate math books. Children and their parents were now presented with unfamiliar learning tools. One of the math textbooks employed was *Go Math*, which was found to contribute to a 0.1 standard deviation increase in performance scores of children who utilized the series (Kane et al., 2016). Supporting the Common Core State

Standards is the focus of the Go Math! K-8 interactive math program (Go Math! K-8, n.d.). Students are challenged at their academic levels with the acquisition of skills through novel resources (Go Math! K-8, n.d.). Changing the math series has been a school practice to align to constantly changing math standards. This leaves parents and children with the need to adapt to these changes.

Various math curricula have been adopted by schools to keep up with the changing standards. “Everyday Mathematics (Everyday Math, aka Chicago Math) is a K-6 curriculum developed by the University of Chicago School Mathematics Project (UCSMP) and published by Everyday Learning Corporation, a part of SRA McGraw-Hill” (Braams, 2003, para.1). Math concepts are presented in a variety of ways, giving students a plethora of strategies to use to complete math tasks (Braams, 2003). This program offers students an opportunity to develop a varied repertoire of mathematical problem-solving skills. Theoretical ideas are presented to students over time through this math program designed through the University of Chicago, School Mathematics Project to teach the Common Core State Standards with activities from everyday life (Everyday Mathematics, 2018a, paras. 1–2). Even the Everyday Math program has had its revisions. The evolution from Everyday Math to Everyday Math 4 enhanced the program. Electronic math resources where performance is evaluated instantly and assistance for families can be found are in the Student Learning Center (Everyday Mathematics, 2018b). This program offers helpful tools for children and their parents. This aid enriches the math education of children and provides parents with the opportunity to gain assistance to help their children with math. Everyday Mathematics is a curriculum used in many schools in the United States.

Math programs that were found to be successful outside of the United States were adopted in America as well. Hoven and Garelick (2007) stated that after exploring why students

in Singapore consistently performed at elevated levels on global assessments in mathematics, Singapore math resources were evidenced and began to be utilized across America. Finding math programs that help students succeed in math was a goal of American educators. Achieving and maintaining a competitive global status in mathematics was important to leaders in math education throughout the United States. In Singapore Math, the ideas and concepts are initially presented in basic ways with few words, which is advantageous to students who may not be strong readers or students whose first language may not be English (Hoven & Garelick, 2007).

The structure of the program provides for various students' learning needs. A prominent feature of Singapore Math is instruction using the "*bar model* technique" to solve many kinds of math problems (Hoven & Garelick, 2007, p. 28). Children have a strategy with an illustration to use as an exemplar in investigations in math. Lessons are complex even though they appear to be easy (Hoven & Garelick, 2007). What looks like undemanding tasks, are actually complicated. In each new lesson, strategies showing how to use each idea and procedure, along with related samples, are given to the children (Hoven & Garelick, 2007). The young scholars receive valuable support throughout the instruction of Singapore Math. Children are proficient at answering complicated math problems and ready for higher level math classes at the end of elementary school (Hoven & Garelick, 2007). This program works to prepare students throughout the school-age years for the advancement of mathematics instruction. The U.S. Department of Education Institute of Education Sciences (2015) Intervention Report neither proves or denies the success of Singapore Math:

Because no studies meet WWC group design standards at this time, the WWC is unable to draw any conclusions based on research about the effectiveness or ineffectiveness of

*Singapore Math* on the achievement of primary students in kindergarten through grade 8.  
(para. 1)

This program from another country is used in the United States to try to raise achievement scores in math to rival international counterparts.

Becoming competitive in mathematics worldwide is reflected in math education in the United States. To ensure America's standing around the world in STEM careers, today's children are being educated in these areas (Reeve, 2015). Grooming students for jobs in science, technology, engineering, and mathematics is an aim of American schools. There is a demand for more workers in the STEM fields and institutions in higher education are urging students into these areas of study (Reeve, 2015). According to Reeve (2015), the outline of STEM is as follows:

- Science: study of the natural world.
- Technology: modifying the natural world to meet the needs and wants of society.
- Engineering: using math and science to create technology.
- Mathematics: a language of numbers, patterns, and relationships that tie science, technology, and engineering together. (p. 12)

Providing instruction in schoolrooms in a combination of these fields has an effect on students' abilities. Through STEM education, students create answers to actual dilemmas by employing "critical thinking and problem-solving skills" (Reeve, 2015, p. 13). STEM education is popular and has gained national attention.

The STEM program received national support. President Obama's Educate to Innovate 2009 initiative supported educating students in STEM (Pienta, 2010). To show dedicated support toward this program, resources were allotted to provide for students being educated in



these fields. To advance even more of the nation's youth into STEM education, the president secured over \$200 million of additional support in 2015 from various contributors (Office of the Press Secretary, 2015). STEM has also transformed. To incorporate an innovative dynamic of instruction of the arts, STEM has recently progressed to science, technology, engineering, art, and math or STEAM (Sochacka, Guyotte, & Walther, 2016). School curricula are constantly changing.

Along with STEM and STEAM, there has been an evolution of computer science in classrooms (Smith, 2016, "Summary," para. 1). Guzdial and Morrison (2016) explained that to incorporate computer science into STEM, "the Congress passed the STEM Education Act of 2015" (p. 31). United States students will be educated in computer science. Additionally, former President Barack Obama introduced the Computer Science for All Program in 2016 with the goal of providing abilities and resources in acquiring and producing technical science to all U.S. children (Smith, 2016). Students will be absorbed in computer science nationwide. To meet the demands of the changing work force into technology fields, computer science has become an essential academic proficiency for students of all ages to acquire (Smith, 2016). Families agree that this is what their children should be learning. "More than nine out of 10 parents surveyed say they want computer science taught at their child's school" (Smith, 2016, "The Need for CS for All," para. 2). This addition to the curriculum changes what children will be learning and the way they will be learning in school. Instruction in "digital representations, algorithms, and networks" is encompassed in the computer science curriculum (Guzdial & Morrison, 2016, p. 32). Technology instruction is advancing in classrooms. Coding is being taught to students of all ages and grade levels globally (Moreno-Leon, Robles, & Roman-Gonzalez, 2016). Children in many nations are acquiring technology education. Martin (2017)

asserted that people inside and outside the realm of education are finding coding for children a prevalent subject for discussion. Aiming students toward computer literacy has become a popular educational trend. Many changes in the U.S. curricula have pushed education into new, advanced, demanding, and complicated realms. This leaves many parents unaware of and inexperienced in these novel and advanced concepts. Therefore, they are unable to assist their children in the education process particularly in math.

### **Parents Left Unequipped**

The ever-changing school curriculum in mathematics has had an adverse effect for families. The evolution of the math curriculum in elementary schools has negatively impacted parents' ability to assist with homework (Ginsburg et al., 2008). The math curriculum has evolved so much that parents lack the proficiency to help their children with math. In their interviews of over 50 parents of urban public elementary school students in Grades 2 through 5 in the northeast, Ginsburg et al. (2008) found that while all parents "felt concern for their children's learning and feelings of responsibility towards helping their children with homework"; some parents were ill-equipped to be able to help their children (p. 22). Parents wanted to aid their children, but were not able to do so. Parents need and want to learn mathematics to be able to assist their children with learning math at school (Ginsburg et al., 2008). Parents' aptitudes to help their children with math has been affected by this curriculum shift.

Schools need to equip parents to be proficient in performing their duties in educating their children. Knowing how to assist with math is important to parents and children. Griffin and Galassi (2010) reported that parents were unknowledgeable about how to assist their children. Parents believed this hampered student accomplishments (Griffin & Galassi, 2010). With assistance from schools, parents can aid their children in math.

A lack of competencies in how to help their children with math affects more than student academic success. The family is impacted. Pressman et al. (2015) aimed to determine the impact of homework on the family by surveying over 1,000 parents of students from kindergarten to the end of secondary school. It was concluded that anxiety mounted in families when parents became less confident about their skills in helping students with homework (Pressman et al., 2015). Relationships within the family were affected because parents were not secure in how to help their children with schoolwork at home.

It has been found that as children advance to higher grades involving more challenging math skills, parents withdraw from helping their children with math. Most assert “that family involvement drives school achievement”; however, “parents tend to leave math to the school as their children rise through the grades and move beyond arithmetic” (Goldman & Booker, 2009, p. 369). Goldman and Booker (2009) pointed out that it is unnecessary for parents to distance themselves (p. 369). When self-efficacy is fostered, there is a greater probability that parents will assist students with math homework (Goldman & Booker, 2009, p. 385). If parents’ proficiencies in aiding children with math advance, parents are apt to aid their children more with math homework.

### **Increasing Parent Competencies in Assisting Children with Schoolwork**

Increasing parent competencies in helping children succeed is vital. Henderson and Mapp (2002) recognize the value of building parent efficacy:

Efficacy comes from feeling confident that they can help their children do well in school and be happy and safe. It also comes from feeling they can overcome negative influences on their children and have a positive impact on the school and neighborhood. (p. 64)

Schools can help build parent self-efficacy in aiding their children with math at all levels as their children progress throughout the school-age years. Henderson and Mapp (2002) suggested that schools advocate for families in aiding and directing the students through the elementary school years and beyond. There are many ways educators can offer assistance to parents. Henderson and Mapp cited several interventions that have been proven to be effective from Grades K–8. They include ongoing conferencing and communication on the growth and performance of students, training and materials in areas of parent interest in subjects like math, reading, and science, and “interactive homework” (Henderson & Mapp, 2002, p. 62). Schools and other organizations can be preemptive in maintaining parent efficacy in math as children go from elementary to higher education.

There are other resources available to parents. An association that is not for profit that works to arm parents with knowledge, resources, and actions to take to enable their children to be productive in school is Learning Heroes (2016). The Learning Heroes’ “Parents 2016: Hearts and Minds of Parents in an Uncertain World” Survey report of a national sampling of about 1,400 parents of Kindergarten through eighth grade students, revealed that parents thought they were influential in the success of the students at school (Learning Heroes, 2016, p. 11). Believing in their impact is a starting point for parents, but effectuating that belief is another issue. It was also found that parents had difficulty assisting students with work assigned to be completed at home, especially those parents whose primary language was Spanish and parents who had middle school students (Learning Heroes, 2016). The education of parents was taken into consideration as well. Almost 40% of parents who attained more schooling after high school reported having trouble assisting with schoolwork assigned to be completed at home, while over 50% of parents whose highest education was at most graduating from high school had

trouble assisting their students with homework (Learning Heroes, 2016, p. 18). Multiple issues impact many parents' abilities to help their children with learning the school work required of them. Feeling uneducated about the schools' expectations for their child at each grade was experienced by more than 30% of parents surveyed (Learning Heroes, 2016, p. 13). All parents need to be informed about what their children need to learn throughout the school-age years. Over 60% of parents surveyed said that receiving strategies on how to help their children increase proficiencies in math and English would be especially beneficial to them (Learning Heroes, 2016, p. 17). Over half of the parents in this survey expressed a desire for tools to increase their competencies in helping their children in specific subjects like mathematics. Parents recognize their influential role and their need of interventions to fulfill it.

Parents need assistance. Bronfenbrenner (2005) indicated that to accomplish their goals and responsibilities, parents require help. He goes on to state that lack of necessary aid can have a negative impact on academic success, law enforcement, and associations between individuals (Bronfenbrenner, 2005, p. 199). Bronfenbrenner shared his belief that from birth until death "the family is the most effective and economical structure for nurturing and sustaining the capacity of human beings to function effectively in all domains of human activity—intellectual, social, emotional, and physiological" (p. 248). Bronfenbrenner's ideas are supported by others. Stephen F. Hamilton and Stephen J. Ceci concur with Bronfenbrenner's idea that the family plays a critical role in the life of a child and assert that providing resources to supplement families is a function of educators and law makers (as cited in Bronfenbrenner, 2005, p. 284). The family is an essential influence in a child's life and schools can seek ways to affectuate that influence to help overcome obstacles faced in math education in our country.

## **The Need for Mathematic Intervention**

Students in the United States need to progress in mathematics. There is an unquestionable indication that students' math scores can further progress after considering trends in students' math performance (Goforth, Noltemeyer, Patton, Bush, & Bergen, 2014; Trends in International Mathematics and Science Study [TIMSS], 2015b). Raising math proficiencies in school-age children is necessary. A rising concern for children in America to attain universally viable math achievement scores has manifest. As Goforth et al. (2014) pointed out, there is a mounting concern for American students to be "internationally competitive in mathematics and science" as people develop a worldwide focus (pp. 196–197). Investigations disclose the standing of the math accomplishments of U.S. students. American fourth graders scored just above half of the competing countries in mathematics in the TIMSS (Goforth et al., 2014, p. 197). This low rating was a concern for the nation's leaders. In response to low math scores, the United States endorsed the NCLB and Race to the Top of 2009; however, the worry about students' performance in math prevailed (Goforth et al., 2014, p. 197). Attention in advancing the nation's math status exists as additional proof of the lack of substantial accomplishments in math prevails.

**NAEP.** Further assessments note the low-test scores of American students in mathematics. The NAEP is a nationwide test given to students in Grades 4, 8, and 12 to document what they know in several key subjects including math (NAEP, 2017). Student proficiencies are assessed at Grades 4, 8, and 12. The NAEP 2011 indicated that "only 40% of the fourth grade students and 35% of eighth grade students were at or above proficient levels of performance in 2011" (Goforth et al., 2014, p. 197). This information indicates that less than 50% of tested students met or exceeded their expectations in math. Additionally, eighth grade

subject matter was only comprehended at a basic level by approximately 70% of the children (Goforth et al., 2014, p. 197). About three quarters of the students functioned at a minimum academic standing in math. Outcomes are documented for sample population clusters rather than each child’s personal scores (NAEP, 2016) and 4 years later, the testing showed no improvement and even lower scores than in the test taken 2 years earlier. The 2015 results of the NAEP in math in Grades 4 and 8 show no growth in math performance and a decrease since the 2013 assessment (Nation’s Report Card, n.d.a). Similar results were found for students in Grade 12 (Nation’s Report Card, n.d.b). Table 1 shows that significantly less than half of the students in Grades 4, 8, and 12 met or exceeded their expectations in math.

Table 1

*NAEP 2015 Results Indicating % of Students Meeting or Exceeding Expectations by Grade Level*

Grade	Percent of students meeting or exceeding expectations in mathematics on the 2015 NAEP
4	40%
8	33%
12	25%

*Note.* Adapted from “2015 Mathematics and Reading Assessments,” by Nation’s Report Card, n.d.a, [https://www.nationsreportcard.gov/reading\\_math\\_2015/#mathematics?grade=4](https://www.nationsreportcard.gov/reading_math_2015/#mathematics?grade=4); “2015 Mathematics and Reading at Grade 12,” Nation’s Report Card, n.d.b, [https://www.nationsreportcard.gov/reading\\_math\\_g12\\_2015/#mathematics](https://www.nationsreportcard.gov/reading_math_g12_2015/#mathematics)

**SAT.** The SAT is another means of determining student progress in math in the United States. The arithmetic average mathematics score for high school students taking the 2011 SAT remained the same as the arithmetic average mathematics score from 2001 (College Board, 2011). No improvement was shown in math among the two sets of test takers 10 years apart, despite a few years in between having a raise of up to 6 points (College Board, 2011). Students taking the SAT in 2011 scored the same as their peers did a decade earlier, showing that any advancement in math made after 2001 could not be maintained.

**TIMSS.** Another assessment for mathematics progress of students is the TIMSS. The TIMSS has been administered in 4-year intervals since 1995 to fourth and eighth grade students around the world (TIMSS, n.d.). TIMSS Advanced is administered periodically to high school seniors worldwide but the United States only participated twice (TIMSS, n.d.). The TIMSS (2015b) results tell us that children in Grade 4 across the nation have raised means in mathematics in a span of 2 decades from 518 to 539, though no significant progress was made from 2011 to 2015. The lack of progress during the 4 years between the 2011 and 2015 assessments show that American fourth grade children's growth in math is stagnant. Since indicating a mean in 1995 of 492, children's mean scores in mathematics in Grade 8 on the TIMSS steadily improved and in 2015 was 26 points higher (TIMSS, 2015b). However, the TIMSS (2015a) Advanced 2015 study of children in Grade 12 who had taken advanced courses in mathematics shows that no progress was made in advanced math means since the 1995 study and in fact the mean decreased by 12 points in 2 decades. The TIMSS (2015b) indicates that by eighth grade, students had increased proficiencies in mathematics. However, the high school seniors taking advanced classes decreased math learning (TIMSS, 2015a). Education leaders in the United States should heed these results and make necessary evaluations of current math initiatives and implement deemed actions in order for United States children to maintain knowledge and skills to succeed in math.

**Program for International Student Assessment (PISA).** There is another established global assessment of secondary school students. The Program for International Student Assessment (PISA) is an international test given to high school students worldwide (Program for International Student Assessment (PISA) Overview, n.d.a). Under the management of the Organization for Economic Cooperation and Development (OECD), an intergovernmental



organization of industrialized countries, the PISA is administered to children in high school around the world every 36 months and measures “reading, mathematics, and science literacy” (PISA, n.d.a, para. 1). Secondary students are assessed globally to determine their progress in specific subject areas compared to peers around the world. The results of the 2015 PISA indicated that half of the participating countries performed better than the average score in literacy in math and the score of the highest achieving group of American children who were 15 years of age (PISA, n.d.b). The mean OECD score was 490 and the mean of American students in mathematics literacy was 470 (PISA, n.d.b). The 2015 mean of 470 was less than the four previous American PISA scores and decreased 17 points since the 2009 PISA assessments (PISA, n.d.c). American students are losing ground in mathematics. Room for improvement in math education in the United States is evident. With interest in remaining globally competitive, these results show our country is at risk in the area of mathematics.

**PARCC.** Narrowing down the focus to young scholars in New Jersey shows students in the Garden State have far to go to improve math scores. Students in Grades 3–8 in New Jersey show a need for improvement in math scores according to released results of the 2016 Spring Assessment of the PARCC (New Jersey Department of Education, 2015-2016). Table 2 shows that slightly over 50% of the students in Grade 3 and less than 50% of students in Grades 4–8 met or exceeded their goals in learning math assessed by the PARCC (New Jersey Department of Education, 2015-2016). Only about one quarter of the eighth grade students in the state attained necessary math competencies. About half of New Jersey’s students in Grades 3–7 and almost 75% of the children in eighth grade have not attained proficiency in mathematics. That is a significant number of children with deficits in knowledge and skills in mathematics.

Table 2

*PARCC Spring 2016 Math Results Indicating % of Students Meeting or Exceeding Expectations by Grade Level in the State of New Jersey*

Grade	Percent of students meeting or exceeding expectations in mathematics on the Spring 2016 PARCC
3	52%
4	47%
5	47%
6	43%
7	39%
8	26%

*Note.* Adapted from “PARCC Spring State Summary Report,” New Jersey Department of Education, 2015-2016, <http://www.state.nj.us/education/schools/achievement/16/parcc/spring/Grade0308.pdf>

### **Need for Specific Math Intervention Strategies for Parents to Help Their Children Achieve**

Researchers recommend finding specific school-related parent involvement strategies that are beneficial for families to improve students’ academics. Van Voorhis, Maier, Epstein, and Lloyd (2013) indicated a need for quality programs that involve families to improve student academic outcomes. When effective parent interventions are evidenced, they can be shared with the greater education community. Okpala et al. (2001) pointed out that the manner in which families are engaged can help determine the success of the engagement of families and that finding out which parent participation activities advance children’s success at school is a necessity. Schools need to identify parent intervention strategies that are efficacious in order to inform parents and help children prosper scholastically.

Finding successful math intervention strategies for parents is vital. Studies continue to show the importance of involving parents in their children’s mathematics education. To assist educators in securing an advantageous experience in math for all children, finding parent

engagement activities that increase children's success in math can be beneficial (Sheldon & Epstein, 2005). Finding math intervention strategies that are beneficial to parents will help children succeed academically.

It is valuable for schools to know which strategies produce positive outcomes and how to best facilitate those approaches. Patall, Cooper, and Robinson (2008) found that young scholars fulfilled tasks assigned by the teachers to be done at home with less difficulty when families were engaged in the completion of those tasks which enhanced student success at school. Family assistance insured schoolwork was done at home, which helps secure student attainment of necessary competencies. It is important to know what forms of parent engagement activities enhance a child's academic success and how to best secure those opportunities (Van Voorhis et al., 2013). With this knowledge, school leaders can promote those specific kinds of activities and encourage parent engagement in them in order to increase parent and student efficacy in mathematics.

With assistance from schools, all parents can learn to help their children with math. In a 2013 report of current research on family involvement in language arts, math, and "social-emotional" development in young children, it was found that despite family demographics, parents are capable of assisting in students' education with assistance from schools and they welcome resources to do so (Van Voorhis et al., 2013, pp. iii, 79, 84). Parents desire knowledge and skills to help their children succeed. To find parent engagement practices that produce enhanced student academic achievement, further research is necessary (Van Voorhis et al., 2013, p. 81). Specific avenues for effectual family practice should be determined. Without a doubt, students thrive academically when parents are engaged in strategies at home that directly relate to the area of study (Van Voorhis et al., 2013). The participation of families cannot be

underrated. Van Voorhis et al. (2013) suggested that future studies involve “which parent-school communications and strategies not only have direct and indirect effects on specific reading, math, and social skills but also increase the number of literacy- or math-learning activities that parents conduct with confidence” and how to best put these into practice (p. 80). Finding math intervention strategies that are reported to be helpful to parents is beneficial to the home, school, and future researchers.

### **Raising Mathematics Achievement Through Effective Family Engagement**

Effective parent involvement can be beneficial in raising students’ math scores. Research indicates parent involvement activities can improve student outcomes in mathematics (Sheldon & Epstein, 2005; Van Voorhis, 2011; Van Voorhis et al., 2013). According to Goforth et al. (2014), children’s success in math is affected by the ideas and beliefs their parents have of mathematics. Knowing this can help schools shape parents’ viewpoints by providing them information and intervention strategies. Students performed better in math when their parents perceived them as academically successful and capable of competing with peers, having good memories, and being able readers (Goforth et al., 2014, p. 208). Students prospered when their parents believed in them. Schools can take this into consideration when planning parent participation that advances students’ capabilities in math.

Schools can arrange opportunities to improve student attainment through effectual engagement of parents. Henderson and Mapp (2002) recommended that the advancement of student academic success be an objective of parent involvement. This includes providing parents with information and resources with guidance on proper utilization of such and workshops on helping students learn certain proficiencies (Henderson & Mapp, 2002). Schools must provide intervention strategies for parents to increase their competencies in helping their children learn.

Families can be involved in fun and educational activities and courses that have already been developed such as “TIPS (Teachers Involving Parents in Schoolwork) interactive homework, and Family Math and Family Science” (Henderson & Mapp, 2002, p. 65). Schools can also develop their own programs unique to their district. Whether schools create interventions according to the needs of their district or participate in established family programs, they need to supply parents with ploys to procure competencies in aiding their children particularly in math.

Programs that provide family involvement in collaborative math strategies have been found to be successful. To offer children and their parents opportunities related to the school’s educational program which involve employing and communicating with math at home is essential for schools to do to enhance children’s math success (Sheldon & Epstein, 2005). Sheldon and Epstein (2005) found these “are more likely than are other involvement activities to contribute to students increasing and maintaining their mathematics skills” (p. 204). There are benefits to family engagement in collaborative math intervention programs.

### **Effective Family Engagement in Mathematics**

Studies show that effective family involvement in mathematics can be achieved through various intervention strategies. Through the participation of families in programs such as Family Math from the Lawrence Hall of Science in California, the Funds of Knowledge and Bridges Project from the University of Arizona, and the Algebra Project, Goldman and Booker (2009) recognized avenues for parents to influence math achievement in schools. In this case study of three families, children reported that math work assigned to be completed at home was the only “school math” they did (Goldman & Booker, 2009, p. 372). This indication shows how advantageous it is for schools to enable parents to aid their children with math. One family saw the value of involving children in working through the challenges that arise in their everyday

experience (Goldman & Booker, 2009, p. 383). Parents did not recognize all the mathematics they utilized in these encounters (Goldman & Booker, 2009, p. 383). Parents had been using math without knowing it. By bringing this to parents' attention, parents can be empowered. Parents and children in the case study assessed choices to resolve situations and found solutions to arising challenges in their everyday lives using academic math tools and resources without realizing it (Goldman & Booker, 2009, p. 384). There was a transfer from what was presented in school to what was done at home. Parents were able to construct additional opportunities at home for students to undertake using math constructs once the many occasions to resolve challenges occurring in daily life were recognized (Goldman & Booker, 2009, p. 385). Parents need to see that they are capable of training their children and reinforcing the math presented at school with their children at home.

The findings compelled Goldman and Booker (2009) to inquire "how might we help cultivate and legitimate the family as a site for math teaching and learning?" (p. 384). The researchers make a solid case for educators to realize the value of the math imparted at home as well as the math presented at school (Goldman & Booker, 2009). With enhanced self-efficacy parents are more apt to assist with math homework and more school math can be incorporated by families at home in the process of everyday activities when attribution is given to the significant roles families play in students' education in math (Goldman & Booker, 2009, p. 385). If schools know that teaching parents how to aid their children raises student performance, schools should offer many interventions to secure that all families are empowered to be effectual instruments for the child's academic attainment in math. Results of this case study suggest that schools can benefit when families are seen as available, promising sources for learning and practicing math

skills (Goldman & Booker, 2009). Schools can influence active parent inclusion and equip parents with the capabilities they need to aid their children with math.

Participation in interactive programs in math can help families. Van Voorhis (2011) reported the outcomes of a study of the Teachers Involve Parents in Schoolwork (TIPS) program showing that parent involvement in the “elementary mathematics, middle school language arts, and middle school science” homework process affects student outcomes (p. 221). The TIPS program involves collaborative activities assigned by teachers to be completed at home by parents and children with the goal of creating a stress-free encounter while impacting student success (Van Voorhis, 2011). Families collectively worked to complete tasks. Information and directions for parents, collaboration between parent and child, and an opportunity for parents to provide feedback to teachers were included in each assignment (Van Voorhis, 2011). The schools gave families a detailed, multifaceted program with specific instructions for each activity. Families testified to being happier about participating together in interactive homework and an increase in standardized test scores for participating children was reported (Van Voorhis, 2011). This research shows that increasing parent engagement to help their children with math matters. All stakeholders profit. The benefits of the program were proven to overshadow the expenses (Van Voorhis, 2011). Interactive math intervention strategies have impacted student achievement and family relations.

Family values play a role in math achievement. Pea and Martin (2010) “studied twenty diverse families with a middle school child” and found “that family life is a math-rich learning context” (p. 2). Math is a regular part of a child’s experience at home. Children’s mathematical thinking and finding solutions to challenges presented at school has its roots in the formation of these processes begun and impressed by family values at home (Pea & Martin, 2010, p. 6). What

parents value tends to have an impact on student achievement in math at home and in school. The utilization of “fractions, decimals, and percents; ratios and proportions; measurement and conversion; odds and probability; basic geometry; charts and graphs; statistics (such as averages), and statistical comparisons” constituted some of the concepts used at home (Pea & Martin, 2010, p. 10). According to Pea and Martin, a variety of skills were used by parents and children in daily life experiences. Through mathematical procedures, parents’ values were displayed. Pea and Martin found that “minimization, sociality, empowerment, beauty, and schoolishness” emerged as the basic values exhibited (p. 14). There is an interrelationship between the math taught in schools and the math used in the families.

When schools recognize the ways that parents have an influence on math taught in school, they can provide opportunities for parents to increase their understanding and abilities of the math taught in the classroom. Schools and families can prosper from each other. Pea and Martin (2010) found that mathematics learned at the educational institution was often used at home (p. 18). Math learned during educational experiences carried over into math used with family situations. Through problem-solving, families used their values and made revisions accordingly (Pea & Martin, 2010). Final outcomes were influenced by values (Pea & Martin, 2010). “These values examples from family math illustrate the complex interconnections between problem solving processes, human relations, cultural practices and tools” (Pea & Martin, 2010, pp. 22–23). Math is impacted by the family at home and school.

Providing for effective family engagement is necessary, profitable, tiring, and rewarding. Staples and Diliberto (2010) submitted that for students to triumph academically, time and effort must be given to create strong bonds between the school and home. It takes considerable work to plan for successful, sustainable home–school unions. Insuring that students receive optimal



learning opportunities is the objective of both families and educators (Staples & Diliberto, 2010, p. 63) All stakeholders want students to excel. Increased family engagement in the children's schooling commences and many constructive effects are noted, as the home and school work together in productive ways (Staples & Diliberto, 2010). The more educators and families cooperate in effectual manners, the more family engagement occurs. It is a conditional cycle. Schools should offer many means of parent engagement, so the greatest number of families can be engaged in varying degrees (Staples & Diliberto, 2010). Through teamwork, the home and school can work together in many ways to increase positive outcomes for everyone involved.

### **Family-School Partnerships and Collaboration**

The home and school can form partnerships to support the education process. "Effective programs to engage families and community embrace a philosophy of partnership" (Henderson & Mapp, 2002, p. 51). Educating the child takes dedicated stakeholders. Supportive school administrators, continuous contact, and interest and regard are essential for effective partnerships (Henderson & Mapp, 2002). Staples and Diliberto (2010) defined "parent involvement" as "a partnership between the parents and the teachers to collaboratively educate the child and foster meaningful educational experiences" (p. 60). The home and school need to work together in consequential ways to impact the child's success. Sanders (2008) stated that an atmosphere of teamwork and recognition of the value of all members in educating the children is necessary for successful alliances to occur (Sanders, 2008, p. 287). Parents and teachers need to work together and consult each other to make the academic program substantial for the child. To provide for effective participation of all parents in the education of students, environments of collaboration can be established by educators (Sanders, 2008, p. 287). Cooperation efforts broaden productive school practice.

Partnerships are essential in procuring a child's school attainment. Securing academic success for students is the result of combined effort on the part of all stakeholders at home, in the educational institution, and in the neighborhood (Henderson & Mapp, 2002). There is a need for validated efficacious interventions to secure that families have what they need to aid their children to become flourishing learners. Henderson and Mapp (2002) recommended more research on the different ways stakeholders are being involved (p. 71), and suggested that future researchers work to identify specific ways families are involved and how families view these programs (Henderson & Mapp, 2002). Providing children with an optimal education involves teamwork of all stakeholders. Validating intervention strategies that constructively impact the family is noteworthy.

### **Parent Universities**

Several school communities across the nation offer parent universities. Through the parent university program in the Charlotte-Mecklenburg Schools in North Carolina, families are recognized as influential in the success of students at school and are provided with information and classes to be effective allies in the learning process (Charlotte-Mecklenburg Schools, n.d.). Parent contributions are valued. Training parents in ways to increase their competencies in helping children be effectual in school is part of the framework of the parent university. In Baltimore County Public Schools (n.d.) in Maryland, parents' desire to advance their abilities to help students learn is met by being given experiences to grow through the parent university. Parents are distinguished as partners in the education process. Through the North Bellmore Parent University, families have access to many resources and trainings to increase their pedagogy and assist their children (North Bellmore School District, n.d.). Parent universities

across the nation are providing effective family engagement through encouragement, reinforcement, information, resources, and training.

### **Framing Family Engagement**

There are various frameworks with which to view family engagement. Daniel (2011) made a case for supporting the “pedagogical conceptualisation of family-school partnerships” with an academic lens (p. 165). Family is referred to as “all those sharing responsibility for the care and raising of the child, within parameters of legal responsibilities and parental, custodian or guardian consent” (Daniel, 2011, p. 166). This is an all-embracing description. Daniel cited several academic lenses used to view influences impacting the academic advancement of students from the educational institution, parents, and the neighborhood. Included are Epstein’s theory of overlapping spheres and the framework of six types of parent involvement as well as Bronfenbrenner’s ecological model of human development (as cited in Daniel, 2011, pp. 167–168). Each of these constructs is a lens with which to view the dynamics between the domestic, educational, and societal influences on the child. To give meaning to the important function the home and society play within the child's academic context, Daniel (2011) looked to “socio-cultural cognitive theories” rooted in work of Lev Vygotsky (p. 168). Sociocultural theorists presume that individuals learn additional information by accessing and activating their learnedness (Daniel, 2011, p. 168). Schools have an opportunity to enact parents’ learnedness and build upon it. Parents play a significant part throughout academic formation (Daniel, 2011, p. 168). Parents influence children’s acquisition of skills and data. Educators can attain insight into familial constructs that influence the student's background and acuties and inform their practice accordingly through continuing collaboration with parents (Daniel, 2011, p. 168). By using this information, teachers can reach children to learn through recognizable, instrumental

contexts. To provide for the optimal education of parents and children of all genera, a wide variety of productive activities for families needs to be substantiated to construct academic underpinnings “of educationally and socially sustainable policy and practice” of alliances between the school and home (Daniel, 2011, p. 174). Finding effective family engagement activities for families of all demographics is necessary to inform school routines and procedures.

### **Theoretical Framework**

#### **Epstein’s Framework of Six Types of Involvement for Comprehensive Programs of Partnership**

Epstein’s (2011) framework of six types of involvement for comprehensive programs of partnership is a key to successful home–school–community connections. The framework contains six key elements. This framework was used as a theoretical lens in this current study. Using this framework, Epstein (2011) conveyed engagement at all school-age levels that exist between the home, school, and community (p. 415). It is an extensive resource for educational institutions to consider when actively engaging families. The framework includes key research-based engagement strategies used to inform practice involving all stakeholders in helping children succeed throughout the school-age years (Epstein, 2011, p. 394). A plethora of strategies to involve families of children in all grades have been studied and incorporated in this tool. Any or all of the various strategies of engagement can be employed by institutions to meet the objectives of their particular programs (Epstein, 2011, p. 396). Educational institutions can choose to utilize a strategy and evaluate its effectiveness in that environment. Many strategies exist to try out for usefulness in different situations and may have varied outcomes (Epstein, 2011, p. 396). Each institution that utilizes the strategies can evaluate the effectiveness of the strategy in their experience and make necessary adjustments. Attention is given to explaining the meanings of specific terms, outcomes that can be anticipated from implementation, and the

complexities existing among each key element (Epstein, 2011, pp. 396–402). Epstein’s (2011) typology is a valuable research-based resource that any academic institution interested in effective alliances can employ. It equips leaders with a number of tried and true ideas that can guide their family engagement practice.

**Type 1: Parenting.** The typology begins with a section on parenting. As children proceed from elementary school to high school, parents are their primary caregivers and accountable for making sure their essential needs are met (Epstein, 2011, p. 417). The role of parents is extensive and requires a great deal of work to provide for the needs of the family. Strategies to aid families in this role and provide knowledge about family influences to educators, are elements of the first section of the framework (Epstein, 2011, pp. 417–418). Parents are instrumental in helping their children succeed (Epstein, 2011, p. 418). The recognition that parents are significant contributors toward children’s academic success is acknowledged in this construct. Schools can provide information and training opportunities to help parents fulfill their roles throughout the school-age years (Epstein, 2011, p. 418). General parenting needs can be facilitated by schools as the children progress through the education system. This will not only help parents with their obligations but will also work to help insure child success at school.

**Type 2: Communicating.** Communication between the educational institution and the family is necessary. Through meetings, digital or postal mailings, telephones, web-based resources, and notices sent through students, the educational institution and parents can keep abreast of vital information from each other (Epstein, 2011, pp. 424–425). Parents need to be able to grasp the information they receive. Attention should be given to communicating with parents in a language they can comprehend (Epstein, 2011, p. 425). The content of the

communication should inform parents. Educators can keep parents cognizant of significant issues, student achievement, events happening at school, and so on, through various means (Epstein, 2011, pp. 395–396). Keeping parents abreast of all school-related information is important for parents. Parents' positions can be made known to educators (Epstein, 2011, p. 402). Through ongoing collaboration, schools and families can learn from and impart valuable data to each other to secure the optimum learning environment for children.

**Type 3: Volunteering.** Parent volunteering allows families take part in the education process. All parents should have an opportunity to share their skills and knowledge to help out and can be asked to do so when it is opportune for them (Epstein, 2011, p. 437). Giving all parents a chance to be involved at levels they are comfortable with is important for the home and school. It will take effort on the part of the school to create opportunities for parents to become involved in effectual ways. Involving parents as volunteers in classrooms or assisting in other areas may take assertion and accommodations from the school so parents are able to help out at functions and are shown how to do it (Epstein, 2011, p. 437). It is work for the school, but the benefits are worth the effort. Parents are aware of the interest and appreciation of having them involved when schools work in this manner (Epstein, 2011, p. 437). There are many instances in which parents can volunteer. Parents can participate in all manner of school happenings, serve the students, and aid personnel of the educational institution (Epstein, 2011, p. 437). Parent volunteering can take on many forms and each gives all parents an opportunity to share in the educational process.

**Type 4: Learning at Home.** Parents can effectively learn how to help their children with homework. Homework consists of assignments that are associated with standards being taught in school (Epstein, 2011). Schools provide interventions for parents to increase their

abilities to help their children at home. To reinforce the learning of the competencies that are taught in school, families are given knowledge on how to aid youngsters with related tasks outside of school (Epstein, 2011, p. 442). With this education, parents are equipped to help their children learn the proficiencies that are being taught in schools. Offering resources to aid parents in helping their children complete academic endeavors outside of school throughout the school-age years is an important undertaking (Epstein, 2011, p. 395). Educating families about the expectations of children at each step in the education system is valuable. This dissemination of data can impact students' achievement at school (Epstein, 2011, p. 400). Knowing everything their children are taught at the academic institution is not in the forefront of families' minds (Epstein, 2011, p. 442). What is being taught in school is continually evolving and changing as the young scholars progress through the school-age years; therefore, it is difficult for parents to keep abreast of every competency being acquired. Communicating effectively with child learners about assignments is a weakness in many families (Epstein, 2011, p. 442). Parents lack the ability to know and converse effectually about the education their children are gaining in school. To endow all parents with instruction on what needs to be acquired at every stage throughout the school-age years and how to attain those skills is a procedure of Type 4 (Epstein, 2011, p. 395). To help children advance to the next level each year, parents are given guidance in learning the educational expectations of children and helping them meet success (Epstein, 2011, p. 131). With proper training and opportunities, parents can learn to help their children at home with homework and succeed annually in school.

**Type 5: Decision-Making.** Parents have leadership roles in schools. Parents are engaged at school as active participants “in decision making, governance, and advocacy” (Epstein, 2011, p. 131). Parents act in consulting capacities. School action and support teams,

parent–teacher association (PTA) or organization, and additional bodies associated with advancing education are led by families and local citizens (Epstein, 2011, p. 131). Families have an opportunity to get involved and make changes. They are key facilitators in their localities. Valuable data are relayed to all families and stakeholders in education when educators guide parent delegates in ways to distribute materials effectively as well as in other management capacities (Epstein, 2011, p. 131). Parents can influence the school in positive ways.

**Type 6: Collaborating With the Community.** Maintaining positive relationships within and between all shareholders is essential. Parents, children, and educators gain when schools interact with various local establishments, companies, and higher education institutions to coordinate assets (Epstein, 2011, p. 459). Both the home and school benefit from communication and secured relationships with involved stakeholders. Established relationships between the educational institution and various neighboring entities can provide extracurricular support to the education of children (Epstein, 2011, p. 459). These institutions can offer amenities to all involved parties in areas that the education system is not equipped to do. Assistance with “after-school care, health services, and other resources that coordinate these arrangements” with the goal of encouraging the academic success of students, are examples of benefits these reciprocal relationships can provide (Epstein, 2011, p. 132). The education system becomes more opulent through positive relationships with stakeholders. Effective interactions and relationships with local associations, enhances the atmosphere and academic program of the education institution (Epstein, 2011, p. 459). Supportive alliances can facilitate successful school communities.

For this current study, the lens was narrowed even further to encompass Type 4: Learning at Home (Epstein, 2011). In so doing, the research reflected how schools can sponsor effective



family engagement that parents cite as increasing parents' self-efficacy to assist their children at home with math.

### **Summary**

Family engagement has a range of positive effects, is required by federal law, and can aid in raising student test scores in math. According to the law, family engagement in children's education is a mandated practice because it is believed to be a valuable contributor to a child's scholarship (Domina, 2005; ESSA, 2015; Shaver & Walls, 1998). This literature review included a range of evidence found in empirical research to support the belief that family engagement affects children's educational experiences (Epstein, 2005; Henderson & Mapp, 2002; Van Voorhis, 2011). The ever-changing and demanding math curricula in schools have left parents unable to help their children with math. There is a need for schools to assist parents in learning how to help their children prevail in school (Griffin & Galassi, 2010; Johnson, 1997). Across the nation, math scores need improvement. Family engagement can aid in increasing student math scores through various means, school partnerships, and collaboration. Type 4: Learning at Home of Epstein's (2011) framework of six types of involvement for comprehensive programs of partnership provided a theoretical rationale for this study. Identifying math intervention strategies that parents deem effective is a valuable insight.

## CHAPTER 3

### RESEARCH DESIGN AND METHODOLOGY

This quantitative study was aimed to determine if parents reported that participation in specific math intervention strategies helped increase their ability to help their children with math. This research also included examination to discern if there was an association between parents' participation in the math intervention strategies and parents' reported demographics. Survey data were collected from parents of students in the first through fifth grades. Results were tabulated and outcomes were reported.

#### **Overarching Research Questions**

The study was guided by three overarching research questions:

1. Of the five math intervention strategies, which one has the most parent participation?
2. Of the five math intervention strategies, which is identified as the most helpful?
3. Is there an association between parents' participation in the five math intervention strategies and parents' demographics?

More specifically,

- 3a. Is there an association between parents' participation in Everyday Math Online Tools and Games and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3b. Is there an association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?

- 3c. Is there an association between parents' participation in the HomeworkNOW Program and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3d. Is there an association between parents' participation in Study Island and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3e. Is there an association between parents' participation in Family Math Nights and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?

### **Research Site**

Parents of students in Grades 1 through 5 in a large urban rim school district in the Northeastern region were surveyed to determine if they reported that their participation in various math intervention strategies increased their ability to help their children with math. This group of parents was representative of the total population of parents of students in Grades 1 through 5 in similar urban rim school districts in the United States.

This school district is located in a municipality that is approximately 3 square miles with a population of about 30,000 people. There were approximately 3,000 students in Grades pre-K to 12 and five elementary schools in the district. Because each school is unique, school data are reported for each school individually and summarized below from the School Performance Reports for the 2015–2016 school year.

School A had approximately 350 students in Grades K–5. There was an almost equal percentage of male and female students. A little over 50% were Hispanic and about 25% were Asian. English was spoken in close to 50% of the homes, while Spanish was spoken in 32%.

Students with disabilities made up 11% of the population. English language learners comprised 5% of the population, and 33% of the population were economically disadvantaged. According to results on the PARCC 2015-2016 assessment in mathematics, 59% of the tested students in School A met or exceeded their expectations in math. The statewide percentile was 68%. Table 3 shows the data broken down according to grade level. In the third grade, 75% of the students in School A met or exceeded their expectations in mathematics on the Spring 2016 PARCC. This was 23% higher than the state average. In the fourth grade, 58% of the students met or exceeded their expectations in mathematics on the Spring 2016 PARCC. This was 11% higher than the state average. In the fifth grade, 44% of the students met or exceeded their expectations in mathematics, which was 3% lower than the state average.

Table 3

*PARCC Spring 2016 Math Results Indicating % of Students Meeting or Exceeding Expectations by Grade Level in School A*

Grade	School	State
3	75%	52%
4	58%	47%
5	44%	47%

*Note.* Adapted from “Home,” by State of New Jersey Department of Education, n.d., <https://www.state.nj.us/education/>

School B had approximately 200 students in Grades K–5, with about 24% more male students than female students. It had an almost 60% Hispanic population and 30% Asian population. About 40% of the students spoke English and 40% spoke Spanish in the home. Students with disabilities made up almost 20% of the population. English language learners made up 10% of the population, while approximately 60% were economically disadvantaged.

According to results on the PARCC 2015–2016 assessment in mathematics, almost 45% of the tested students in School B met or exceeded their expectations in math. The statewide percentile was 43% . Table 4 shows the data broken down according to grade level. In the third grade, 35% of the students in School B met or exceeded their expectations in mathematics on the Spring 2016 PARCC. This was 17% lower than the state average. In the fourth grade, 54% of the students met or exceeded their expectations in mathematics on the Spring 2016 PARCC, which was 7% higher than the state average. In the fifth grade, 43% of the students met or exceeded their expectations in mathematics, which was 4% lower than the state average.

Table 4

*PARCC Spring 2016 Math Results Indicating % of Students Meeting or Exceeding Expectations by Grade Level at School B*

School B      % of students meeting or exceeding expectations in mathematics on the Spring 2016 PARCC			
Grade	School	State	
3	35%	52%	
4	54%	47%	
5	43%	47%	

*Note.* Adapted from “Home,” by State of New Jersey Department of Education, n.d., <https://www.state.nj.us/education/>

School C had approximately 260 students in Grades K–5, with about the same amount of male and female students. It had a Hispanic population of just over 40% and an almost 25% Asian population. About half of the students spoke English and 25% spoke Spanish in the home. Students with disabilities made up around 10% of the population. English language learners made up almost 10% of the population, while about 30% were economically disadvantaged. According to results on the PARCC 2015–2016 assessment in mathematics, almost 62% of the tested students in School C met or exceeded their expectations in math. The statewide percentile

was 72% . Table 5 shows the data broken down according to grade level. In the third grade, 62% of the students in School C met or exceeded their expectations in mathematics on the Spring 2016 PARCC, which was 10% higher than the state average. In the fourth grade, 61% of the students met or exceeded their expectations in mathematics on the Spring 2016 PARCC, which was 14% higher than the state average. In the fifth grade, 63% of the students met or exceeded their expectations in mathematics, which was 16% higher than the state average.

Table 5

*PARCC Spring 2016 Math Results Indicating % of Students Meeting or Exceeding Expectations by Grade Level at School C*

School C      % of students meeting or exceeding expectations in mathematics on the Spring 2016 PARCC		
Grade	School	State
3	62%	52%
4	61%	47%
5	63%	47%

*Note.* Adapted from “Home,” by State of New Jersey Department of Education, n.d., <https://www.state.nj.us/education/>

School D had approximately 400 students in Grades pre-K–5, with about 15% more male students than female students. It had an almost 50% Hispanic population and 25% Asian population. About 50% of the students spoke English and 30% spoke Spanish in the home. Students with disabilities made up 34% of the population. English language learners made up almost 10% of the population, while a little over 30% were economically disadvantaged. According to results on the PARCC 2015–2016 assessment in mathematics, almost 68% of the tested students in School D met or exceeded their expectations in math, while the statewide percentile was 85%. Table 6 shows the data broken down according to grade level. In the third grade, 75% of the students in School D met or exceeded their expectations in mathematics on the

Spring 2016 PARCC, which was 23% higher than the state average. In the fourth grade, 66% of the students met or exceeded their expectations in mathematics on the Spring 2016 PARCC, which was 19% higher than the state average. In the fifth grade, 70% of the students met or exceeded their expectations in ,mathematics, which was 23% higher than the state average.

Table 6

*PARCC Spring 2016 Math Results Indicating % of Students Meeting or Exceeding Expectations by Grade Level at School D*

School D	% of students meeting or exceeding expectations in mathematics on the Spring 2016 PARCC	
Grade	School	State
3	75%	52%
4	66%	47%
5	70%	47%

*Note.* Adapted from “Home,” by State of New Jersey Department of Education, n.d., <https://www.state.nj.us/education/>

School E had approximately 300 students in Grades K–5, with about an equal number of male and female students. The student population was about 45% Hispanic and 30% Asian. Almost 45% of the students spoke English and a little over 30% spoke Spanish in the home. Students with disabilities made up 10% of the population. English language learners made up 10% of the population and just over 35% were economically disadvantaged. According to results on the PARCC 2015–2016 assessment in mathematics, almost 62% of the tested students in School E met or exceeded their expectations in math. The statewide percentile was 72%. Table 7 shows the data broken down according to grade level. In the third grade, 64% of the students in School E met or exceeded their expectations in mathematics on the Spring 2016 PARCC, which was 12% higher than the state average. In the fourth grade, 55% of the students met or exceeded their expectations in mathematics on the Spring 2016 PARCC, which was 8%

higher than the state average. In the fifth grade, 67% of the students met or exceeded their expectations in mathematics, which was 20% higher than the state average.

Table 7

*PARCC Spring 2016 Math Results Indicating % of Students Meeting or Exceeding Expectations by Grade Level at School E*

School E	% of students meeting or exceeding expectations in mathematics on the Spring 2016 PARCC	
Grade	School	State
3	64%	52%
4	55%	47%
5	67%	47%

*Note.* Adapted from “Home,” by State of New Jersey Department of Education, n.d., <https://www.state.nj.us/education/>

This district was selected because it is an urban rim district; it possesses characteristics of both residential and metropolitan schools. This particular school district offers parents a variety of math intervention strategies to assist parents in helping their children with math. Grades 1 through 5 were selected because parents would have had some experience in using the district’s resources. The elementary schools begin with pre-Kindergarten and Kindergarten and those parents may not have had the opportunity to participate in all math intervention strategies available. In addition, as shown in Table 8, the majority of the percentages of students’ scores on the PARCC 2015–2016 in the five schools in Grades 3–5 are significantly higher than state averages despite Title I status, or the ethnicity or socioeconomic status (SES) makeup of the school, indicating these students were doing better than their typical peers throughout the state. The researcher believed this warranted further study to see if any of this could be explained by parents participating in the district’s math intervention strategies.



Table 8

*A Comparison of How Students Performed in Schools A, B, C, D, and E at Each Grade Level in Mathematics on the Spring 2016 PARCC Compared to State Average Percentages*

Percent of students meeting or exceeding expectations in mathematics on the Spring 2016 PARCC									
School	Grade 3			Grade 4			Grade 5		
	School %	State %	Difference	School %	State %	Difference	School %	State %	Difference
A	75%	52%	+23	58%	47%	+11	44%	47%	-3
B	35%	52%	-17	54%	47%	+7	43%	47%	-4
C	62%	52%	+10	61%	47%	+14	63%	47%	+16
D	75%	52%	+23	66%	47%	+19	70%	47%	+23
E	64%	52%	+12	55%	47%	+8	67%	47%	+20

*Note.* Difference = percentage variance of the school at each grade level compared to state averages. Adapted from “Home,” by State of New Jersey Department of Education, n.d., <https://www.state.nj.us/education/>

### Population and Sample

The population of this research was parents of children in Grades 1 through 5 in urban rim school districts throughout the United States. The sample of this population was parents of 1,230 children in Grades 1 through 5 in the five elementary schools in one urban rim school district in the Northeastern region. A single-stage sampling procedure was employed. Creswell (2014) described a single-stage sampling procedure in which the principle investigator has a source to the population and can retrieve information from the sample population (p. 158). Parents of children in Grades 1 through 5 were chosen due to the opportunities and experience they would have had in participating in the school-related math intervention strategies being studied.

The sample was selected based on the schools having characteristics of both metropolitan and residential schools and the number of math intervention strategies employed in the district. Each elementary school in this district has qualities of metropolitan and residential schools as

well as its own unique diverse population of families. The findings of this study have limited generalizability. Generalizations found could not be made for all parents of children in Grades 1 through 5 in similar urban rim school districts because it was not a national sample. The sample was from five schools in one school district in one state.

### **Instrumentation**

Parents of all students in Grades 1 through 5 in a large urban rim school district in the Northeastern region received a letter of solicitation and a Parent Survey to complete for this study. The Parent Survey was used to determine if parents found their participation in various math intervention strategies was helpful in increasing their ability to help their children with math (see Appendices A and B).

To ensure that the Parent Survey had face and content validity and measured what it was intended to measure, the survey was pilot-tested with 10 parents of elementary school students who did not participate in the study. These 10 parents read and answered the letter of solicitation and the survey questions before the documents were finalized. Parents of this pilot test were asked to give constructive feedback in verbal and written form. The survey and letter of solicitation were then augmented to incorporate suggestions from parents in the pilot test to make certain the wording was clear, the language was understandable, and that no part of the survey or letter was confusing or misleading. The survey contains similar questions throughout to insure inter-reliability. A Flesch-Kincaid Grade Level analysis of the survey and letter of solicitation was conducted to verify the readability grade level of both documents.

The Parent Survey, reminder notice, and letter of solicitation were translated into Spanish by a language company. An official certificate of accuracy of the translation was received. The

Spanish translations were obtained to meet the needs of the Spanish-speaking families in the population.

A survey was used to collect data because of its convenience in collecting the data from the large number of participants in the sample population. It is an efficient way to get the amount of requested information from a large number of people quickly. Since a survey was utilized to obtain descriptive statistics, it is considered to be a cross-sectional study design. Levin (2006) defined a cross-sectional study design as a single-event study for which a questionnaire is often used to obtain information about a group (“Why Carry Out a Cross-Sectional Study?”). The survey was sent only once and did not recur over time. A Likert-type scale was established as a measurement scale. The survey consisted of 36 items for the parents to report on and five optional, open-ended questions.

Cronbach’s alpha was employed “to assess the internal consistency reliability of multiple item scales” (Leech, Barrett, & Morgan, 2015, p. 90). This is an appropriate practice as “it provides a measure of reliability” when only one survey is distributed in an investigation (Leech et al., 2015, p. 53). The “alpha should be above .70” like “other reliability coefficients,” but if the scale has a small number of items, it may be less (Leech et al., 2015, p. 56). Four items were analyzed for each program. Each item has a scale with five responses. The responses used were *strongly disagree*, *disagree*, *neutral*, *agree*, and *strongly agree*. Results indicated that the Cronbach’s alpha reported for each scale was significantly higher than .70, showing that the internal consistency is very good. The results from the Cronbach’s alpha analyses are reported in Table 9.

Table 9

*Cronbach's Alpha Reliability Statistics*

Program	Cronbach's alpha coefficient
Everyday Math Online Tools and Games	.947
Star Math Reports/Home Connect from Renaissance Learning	.961
HomeworkNOW Program	.975
Study Island	.968
Family Math Nights	.991

**Measures**

The survey was designed and developed by the researcher to meet the specific needs of this study and consists of 36 items and five optional open-ended questions for parents to respond to (see Appendix B). The survey was used to measure the outcomes of parents' experiences with participation in the school district's math intervention strategies as reported by parents. The survey also includes questions about demographics such as grade and school the child attends, parent gender, parent race or ethnicity, parent marital status, and parent relationship to child. The strength of the survey is that it passed through a pilot with 10 parents who were not in the sample population of those being studied and revised according to feedback given.

A letter of solicitation accompanied the survey (see Appendix A) and included an explanation of the purpose of the survey and background information about the researcher and the research study. Instructions for completing the survey were given. If parents had questions about the survey, they were presented with contact information stating who they could contact. There was a statement of the anonymity and the voluntary status of the survey. Steps to maintain the security and confidentiality of the data were presented. Parents were asked not to write any additional information on the surveys other than what was requested to maintain appropriate

levels of security and confidentiality. Information was presented to describe the return of the data to the child's school. Parents were asked to seal the completed survey in the enclosed envelope and send it back to the child's school in their child's backpack by the due date. It is a regular routine of the five elementary schools to send and receive important school information, forms, letters, written communication, and so forth in children's backpacks. That is why that method was selected to distribute and collect the Parent Survey. It was stated that consent to participate was indicated by returning the enclosed survey to the school.

The survey was used to elicit information regarding parents' self-efficacy as reported by parents in response to their participation in math intervention strategies. Parent efficacy refers to parents having "the power to produce an effect" (Henderson & Mapp, 2002, p. 33). Henderson and Mapp (2002) explained that feeling secure in being able to assist students in succeeding academically and feeling content is the basis of the effectiveness of parents. This survey was used to determine which math intervention strategies parents reported as being helpful in increasing their abilities to help their children with math.

Math intervention strategies are programs available for parents to participate in to help them gain competencies in assisting their children with math. This district employs several math intervention strategies to support student learning, including Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, the HomeworkNOW Program, Study Island, and Family Math Nights.

Everyday Math Online Tools and Games is a web-based program to help facilitate family participation in the district's math curriculum entitled Everyday Mathematics. The district has been using this program for 16 years. "Everyday Mathematics is a comprehensive Pre-K through Grade 6 mathematics program engineered for the Common Core State Standards"

(Everyday Mathematics, 2018a, para. 1). The Everyday Mathematics program contains related resources for parents and children. Electronic activities and evaluations of performance provided instantly are offered in the Student Learning Center (Everyday Mathematics, 2018b, “More Engaging For Students”). Families can access the Student Learning Center for activities which reinforce math skills in a fun way and get assistance in the process (Everyday Mathematics, 2018b, “More Engaging For Students”). Families can receive help in assisting children to learn the math skills presented at school. Parents have access to supplemental resources available that support the district’s math curriculum taught in school daily.

Star Math Reports/Home Connect from Renaissance Learning describe progress made by children on Star Math Assessments (Star Math Reports, 2018b). The district has been using this math intervention strategy for 7 years. Families can retrieve these reports on or off school premises electronically for vital information on their child’s math progress and performance (Star Math, 2018a). Parents are kept abreast of their child’s standing and achievement in math by reviewing the Star Math Reports through Home Connect Renaissance Learning at home. This service personalizes the information for parents and gives them access to comprehensive information about their child’s achievement in math. Children can complete math activities at home or places other than school (Renaissance, n.d.a). Through Accelerated Math from Renaissance Learning, families have electronic access at home to vital math resources, math lessons, samples of math problems, child progress, communication from the school, etc. (Renaissance, n.d.b) Renaissance Learning provides families with math resources to help families gain competencies in the math being taught in school. Parents have an opportunity to experience the math curriculum being taught in schools and related information to gain valuable insights to apprise their roles in the education process.

HomeworkNOW provides families with free online access to various school-related resources. The district has been using HomeworkNOW for 9 years. Classwork assigned to be completed at home, announcements from educational personnel, events, pictures, and so forth can all be retrieved by families through this program (HomeworkNOW, 2018). This resource is an asset to families who may have questions about the day's homework assignments. It also gives families an opportunity to directly interact with participating educators. Families have a chance to maintain continued dialogue with educators and administrators (HomeworkNOW, 2018). HomeworkNOW provides parents with timely and personal exchange of memorandum with the personnel of the educational institution, including their children's teachers.

Study Island is a district-wide program that provides students and their families an opportunity to access interactive activities and lessons based on the Common Core State Standards electronically (Study Island, 2017a). The district has been utilizing Study Island for a decade. Parents can gain helpful information that relates to the math curriculum through this intervention. Assessments and improvement tutorials that are instantaneous are part of the web-based lessons (Study Island, 2017c). Parents can view their children's activities of skill acquisition and related tutorials that address areas of student weakness indicated in assessments. By using this program, parents can observe activities and information assigned directly by their children's classroom teacher. This information is tailored to the specific lessons being taught to the child in the classroom (Study Island, 2017b). This study utilized parents' responses to participation in the math component of the program.

Family Math Nights are uniquely designed programs by this particular school district's personnel. The district has offered Family Math Nights on and off for the past 15 years. Teachers in the district present the program to families of elementary school students in the

district, primarily in the Title I schools. One night is designated for families of children in Grades K–2 and another night is geared to families of children in Grades 3–5. Through this program, parents are given valuable information about the district’s math curriculum, available online tools and resources in mathematics, and how to help their children with math. Families participate in fun learning activities to advance math skills and knowledge while enjoying pizza.

### **Procedures**

A Parent Survey and an accompanying letter of solicitation were sent to the parents in their children’s backpacks. After the parents completed the surveys, they sealed them in the enclosed envelopes and sent them back to school in their children’s backpacks. This procedure was selected because it provided a means of quick distribution and retrieval of information from a large amount of people with limited costs. It also allowed for the anonymity of survey respondents. It is a regular common practice in each elementary school in the district to send important forms, letters, and information from the school to parents in their children’s backpacks. Parents routinely check their children’s backpacks for any written communication from the school and respond accordingly. It has been a tried and true practice in the school district and parents would expect school communication to arrive at their home in this manner. The school also expects communication from parents to be sent to school in the children’s backpacks. Because of this, it was an appropriate, customary, and efficient way to obtain requested survey data for this study.

The survey was voluntary, anonymous, and no identifying information was requested other than the grade level and school. The name of the school of the child was reported with a fictitious name. The elementary schools were reported as School A, School B, School C, School D, and School E. It was anticipated that it would take about 15 minutes for parents to complete



the survey. After completion, the parents sealed the survey in the enclosed envelope and sent it back to school in their child's backpack. The school secretaries collected the sealed envelopes and delivered them to the researcher. Parents had approximately two weeks to complete and return the survey. Halfway through the allotted time for the survey to be completed and sent back to school, the researcher had the school send a reminder note to parents in their child's backpack. This note served to remind parents of the due date of the Parent Survey. The survey data were securely stored on a USB flash drive and kept in a locked safe.

The researcher received permission to conduct this study from the Seton Hall University Institutional Review Board (IRB) and from the local school leaders and board of education. A letter was written explaining interest in conducting the study, presenting a proposal of the study itself, and sharing the significance it could have to the local district, families, and to the education community at large. The letter was sent to the school superintendent and the board of education (see Appendix C). The Parent Survey and parent letter of solicitation accompanied the letter to the superintendent and board of education. Required adaptations were made to the study and both the board of education and IRB permissions were granted.

### **Human Subject Protection: IRB**

Participants were informed that their participation in the Parent Survey was voluntary and that their responses would remain anonymous. No identifying information was revealed in the study other than the grade level and school of the child. A fictitious name was created for the school of the child. The elementary schools were reported as School A, School B, School C, School D, and School E. This promoted honesty and accuracy of subjects' responses to survey questions.

In order to protect the participants in the study, the researcher successfully completed the National Institutes of Health (NIH) web-based training course, “Protecting Human Research Participants.” Before proceeding in any capacity, research clearance was received from the Seton Hall University IRB. After receiving all permissions to run the study, the researcher began the process.

### **Data Analysis**

The Parent Survey was distributed to the parents, sent back to school in sealed envelopes, and collected by the school secretary who gave the sealed envelopes to the researcher for analysis. The researcher examined the data, conducted analyses accordingly, and interpreted and described the findings in a final report. The data from each research question were evaluated. A descriptive analysis was executed. Tables of outcomes were displayed. Results showed the frequency and percent of how helpful parents indicated their participation was in increasing their ability to assist their child in math and how often parents participated in each strategy. A chi-square test was used to determine if there was an association between whether or not parents participated in each math program and the child’s school, the child’s grade, parent’s gender, parent’s race or ethnicity, and parent’s marital status. Statistical significance was set at  $p < .05$ . Results of these analyses are presented in Chapter 4.

### **Summary**

This chapter included a detailed view of the study methods and design administered by the researcher. Research questions driving the study and information about the research site, population, and sampling strategies were introduced. Instrumentation, measures and procedures as well as the data analysis process were explained. Adherence to IRB protocols was described.

## CHAPTER 4

### RESULTS

Math and how it is being presented in schools is continually evolving and has become increasingly more complex. There has been a growing concern that parents no longer have the knowledge and skills to help their children with math (Ginsburg et al., 2008; Wilder, 2017), calling schools to support and equip parents in this ever-changing, demanding climate. With this in mind, the purpose of this study was to determine if parents believed that their participation in specific math intervention strategies increased their abilities to help their children with math.

This study was conducted to find if participation in various school-related math programs was helpful in increasing parents' abilities to help their children with math. Surveys were sent to parents of 1,230 students in Grades 1 through 5 in an urban rim school district in the Northeastern region. Data were collected and analyzed from 694 returned surveys. The results of the survey data analysis are presented in this chapter.

#### **Overarching Research Questions**

The study was guided by three overarching research questions:

1. Of the five math intervention strategies, which one has the most parent participation?
2. Of the five math intervention strategies, which is identified as the most helpful?
3. Is there an association between parents' participation in the five math intervention strategies and parents' demographics?

More specifically,

- 3a. Is there an association between parents' participation in Everyday Math Online Tools and Games and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?

- 3b. Is there an association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3c. Is there an association between parents' participation in the HomeworkNOW Program and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3d. Is there an association between parents' participation in Study Island and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?
- 3e. Is there an association between parents' participation in Family Math Nights and the school the child attends, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status?

### **Descriptive Analyses**

Descriptive analyses were used to describe and display the data. Frequency and percent of parent responses to the survey questions are reported below. Tabulated results have been summarized and presented accordingly.

Using the Parent Survey, parents described specific demographic characteristics about themselves and their children. The information requested included the school and grade of their child as well as the parent's gender, race or ethnicity, marital status, and relationship to the child. The frequency and percent of the parent responses according to each category are presented in Table 10.

The largest response rate of parents was from School D (about 28%). School A and School C each represented a little over 20% of the respondents. Of the participating parents, 12% came from School B and about 15% came from School E.

Each of the five grades were relatively equally represented in the study except for Grade 1. The majority of the parents in the study (23%) had students in fourth grade. This percentage was only slightly higher than fifth grade at 22%, and second and third grades each at 20%. The percentage of parents with a child in first grade was almost 14%, with the lowest representation.

The majority of respondents were female (70%). A little less than half of the participants were Latino–Hispanic parents, followed by Asian Americans (about 30%), 14% Caucasians, and 6% African Americans.

The marital status of the greater part of the parent population, or just over 80% of those in the study, was married. Approximately three quarters of the mothers completed the study.

Table 10

*Frequency and Percent of Parent Responses to Demographic Characteristics*

Characteristic	Frequency	Percent %
<b>School of child</b>		
School A	164	23.7
School B	83	12.0
School C	144	20.8
School D	195	28.1
School E	107	15.4
Total	693	100.0
<b>Grade of child</b>		
First grade	93	13.5
Second grade	140	20.3
Third grade	140	20.3

(continued)

Table 10 (continued)

Characteristic	Frequency	Percent %
Fourth grade	158	23.0
Fifth grade	152	22.1
Multiple grades selected	5	0.7
Total	688	100.0
Parent gender		
Male	199	29.6
Female	473	70.4
Total	672	100.0
Parent's race or ethnicity		
African American	42	6.1
Asian American	224	32.8
Latino–Hispanic	300	43.9
Caucasian	95	13.9
Other	22	3.2
Total	683	100.0
Marital status		
Married	559	81.6
Divorced	35	5.1
Single	91	13.3
Total	685	100.0
Relationship to child		
Father	180	26.0
Stepfather	9	1.3
Mother	502	72.4
Stepmother	2	0.3
Total	693	100.0

On the Parent Survey, parents indicated if they participated in the five intervention strategies (see Table 11). Of the 684 parents who responded to whether or not they participated

in Everyday Math Online Tools and Games, about half (364 or 53.2%) participated and almost half (320 or 46.8%) did not participate. Similar results were found for Star Math Reports/Home Connect from Renaissance Learning: approximately half of the 671 parents (328 or 48.9%) participated and a little over half of the parents (343 or 51.1%) did not participate. For HomeworkNOW, 416 (61.7%) of the 674 parents participated, and about 40% did not participate. HomeworkNOW was the second most popular program with Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning following about 10% behind.

About 65% of the parents said they participated in Study Island and almost 35% did not. Study Island was the program that had the most parent participation of the five math intervention strategies. Parents reported using Study Island over the summer as well as throughout the school year, which may have contributed to Study Island being the most-used program. Family Math Nights had the lowest number of parents who participated. Only 30%, or about 200 respondents, participated in Family Math Nights while about 70%, or 446, did not take part in this program. Family Math Nights was the least-utilized program by parents. This may be the result of Family Math Nights being offered on and off for the past 15 years in the school district, most often presented in one school and, at times, the focus was on attracting Title I families. Based on the survey responses, it should be noted that a very large number of parents did not participate in Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, the HomeworkNOW Program, Study Island, and Family Math Nights.

Table 11

*Frequency and Percent of Parent Responses to Whether or Not They Participated in Each Program*

Program	Yes	No	Total
	Frequency (%)	Frequency (%)	Frequency (%)
Everyday Math Online Tools and Games	364 (53.2%)	320 (46.8%)	684 (100.0%)
Star Math Reports/Home Connect from Renaissance Learning	328 (48.9%)	343 (51.1%)	671 (100.0%)
HomeworkNOW	416 (61.7%)	258 (38.3%)	674 (100.0%)
Study Island	439 (65.3%)	233 (34.7%)	672 (100.0%)
Family Math Nights	199 (30.9%)	446 (69.1%)	645 (100.0%)

The first question parents responded to on the survey for each program was, “How helpful was participating in increasing your ability to help your child with math?” Table 12 shows the frequency and percent of parents’ responses to this question for each of the five programs. The range of responses was on a scale of 1 (*Not at all helpful*) to 5 (*Extremely helpful*). Out of the 358 respondents to the question for Everyday Math Online Tools and Games, the vast majority of the respondents (93.4%) found the program helpful in increasing their ability to help their child with math. Similar results were observed for Star Math Reports/Home Connect from Renaissance Learning, with 93% of the parents reporting it to be a helpful program, and 89% of the parents reported HomeworkNOW was helpful to them. Almost 92% of the parents said Study Island was helpful, while 91% of the parents who attended Family Math Nights reported it was helpful. It is obvious from these results that the majority of parents found all five programs useful in increasing parents’ abilities to help their children with math. Everyday Math Online Tools and Games (93.4%) and Star Math Reports/Home Connect from



Renaissance Learning (93%) were identified as being the most helpful math intervention strategies.

Table 12

*Frequency and Percent of Parent Responses to How Helpful Participating in Each Program Was in Increasing Parents' Ability to Help Child with Math*

	Everyday Math Online Tools and Games	Star Math Reports/Home Connect from Renaissance Learning	HomeworkNOW	Study Island	Family Math Nights
Helpfulness	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Not at all helpful	5 (1.4%)	6 (1.8%)	23 (5.6%)	9 (2.1%)	2 (1.0%)
Not very helpful	19 (5.3%)	17 (5.2%)	22 (5.4%)	27 (6.3%)	15 (7.8%)
Helpful	157 (43.9%)	145 (44.6%)	144 (35.0%)	171 (39.9%)	82 (42.7%)
Very helpful	113 (31.6%)	98 (30.2%)	136 (33.1%)	135 (31.5%)	51 (26.6%)
Extremely helpful	64 (17.9%)	59 (18.2%)	86 (20.9%)	87 (20.3%)	42 (21.9%)
Total	358 (100.0%)	325 (100.0%)	411 (100.0%)	429 (100.0%)	192 (100.0%)

The second question of the survey was how often parents participated in each of the five programs. The frequency and percent of the responses are shown in Table 13. Possible responses ranged from *1-2 times a month to daily*.

Results displayed in Table 13 indicated that almost half of the parents who utilized Everyday Math Online Tools and Games said they used it 1-3 times a week. Approximately 40% of the parent respondents reported to have accessed each of the other programs 1-3 times a week. For all the programs in Table 13, the highest response for how often parents participated was 1-3 times a week. HomeworkNOW was used by the most parents (30%) on a daily basis.

This makes sense because through the HomeworkNOW program, parents can access and monitor daily homework assignments. Parents can keep abreast of what work students need to do every day in each subject and get feedback and tools to assist in the process. Parents have direct communication with the child’s classroom teacher through this program as well. In each of the other programs, about 14% to 17% of the parents indicated they were used daily. About 16% of parents reported they used HomeworkNOW 4-6 times a week. HomeworkNOW was the second-most popular program.

Table 13

*Frequency and Percent of Parent Responses to How Often Parents Participated in Four of the Programs*

	Everyday Math Online Tools and Games	Star Math Reports/Home Connect from Renaissance Learning	HomeworkNOW	Study Island
How often participated	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
1-2 times a month	83 (23.9%)	100 (32.1%)	70 (17.7%)	114 (27.7%)
1-3 times a week	164 (47.1%)	136 (43.6%)	143 (36.1%)	180 (43.7%)
4-6 times a week	42 (12.1%)	30 (9.6%)	63 (15.9%)	54 (13.1%)
Daily	59 (17.0%)	46 (14.7%)	120 (30.3%)	64 (15.5%)
Total	348 (100.0%)	312 (100.0%)	396 (100.0%)	412 (100.0%)

Family Math Nights had a different question and range of responses for how often parents participated (see Table 14). The question for Family Math Nights was, “How often did you participate in the past 6 years?” The possible responses for how often parents participated in Family Math Nights in the past 6 years ranged from *1 time* to *6 or more times*. About half of the

parents ( $n = 173$ ) compared to the 300 to 400 respondents for each of the other four programs, answered this question about Family Math Nights. Therefore, a lower frequency for responses was seen as compared to the other four programs on the question about how often parents participated in each.

This low number may be the result of the program most often being presented in one school and not at the other four schools. In addition, the program was offered on and off for the past 15 years in the school district, and there had been times when the focus was on attracting Title I families. This may offer insight into why such a low number of families reported participating in this math intervention strategy. Of the parents who responded to the question, most stated they attended one Family Math Night. This is almost 30% of the 173 respondents. Of the participants, 15% said they attended the program twice. Approximately 30% of the parents reported attending three or four Family Math Nights, while just under 30% responded that they attended 5 or more times. The Family Math Nights category has the least percentage of parents as compared to the other four programs.

Table 14

*Frequency and Percent of Parent Responses to How Often the Parents Participated in Family Math Nights in the Past Six Years*

How often participated in Family Math Nights in the past 6 years	Frequency (%)
1 time	47 (27.2%)
2 times	26 (15.0%)
3 times	39 (22.5%)
4 times	14 (8.1%)
5 times	13 (7.5%)
6 or more times	34 (19.7%)
Total	173 (100.0%)

For the next four items in the Parent Survey, parents responded to a statement about their participation for each math intervention strategy. Responses ranged in a 5-point scale from *Strongly disagree* to *Strongly agree* with *neutral* in the middle. The first statement was: “Participation in this program improved my understanding of math which helped me help my child.” Table 15 shows the frequency and percentage of how the parents responded to this statement for each of the five programs. Of the parents, 80% indicated that participating in Everyday Math Online Tools and Games improved their understanding of math, which helped them help their child. About 15% were neutral and 5% disagreed. About 75% of the parents agreed that Star Math Reports/Home Connect from Renaissance Learning helped improve their understanding of math, while 18% were neutral and 6% disagreed. Of the parents, 70% agreed that HomeworkNOW helped them improve their math understanding, which helped them assist their child. Almost 18% reported being neutral and 12% disagreed. For both Study Island and Family Math Nights, almost 75% of the parents agreed that participating in each improved their understanding of math, which helped them help their child; approximately 18% were neutral and a little over 7% disagreed. In all of the programs, 70% to 80% of the parents agreed that the program helped to increase their mathematical understanding, which helped them help their child. Everyday Math Online Tools and Games had the highest percent of parents stating agreement, which was slightly over 80%. In general, all five programs were cited by most parents to have helped them improve their understanding of math which helped them help their child.

Table 15

*Frequency and Percent of Parent Responses to Participation in Each Program Improved Parent Understanding of Math*

	Everyday Math Online Tools and Games	Star Math Reports/Home Connect from Renaissance Learning	HomeworkNOW	Study Island	Family Math Nights
Improved understanding	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Strongly disagree	5 (1.4%)	5 (1.6%)	28 (6.9%)	15 (3.5%)	7 (3.7%)
Disagree	13 (3.7%)	14 (4.4%)	21 (5.2%)	18 (4.2%)	7 (3.7%)
Neutral	51 (14.6%)	58 (18.3%)	72 (17.8%)	77 (17.9%)	35 (18.6%)
Agree	198 (56.6%)	170 (53.6%)	207 (51.1%)	225 (52.4%)	91 (48.4%)
Strongly agree	83 (23.7%)	70 (22.1%)	77 (19.0%)	94 (21.9%)	48 (25.5%)
Total	350 (100.0%)	317 (100.0%)	405 (100.0%)	429 (100.0%)	188 (100.0%)

The next statement the parents responded to in the survey was, “Participation in this program gave me skills and resources to help me help my child with math.” Table 16 displays the frequency and percent of parent responses to that statement for each of the five programs. Approximately 82% of the parents agreed that Everyday Math Online Tools and Games gave them skills and resources to help them help their child with math. Between 71%–77% of the respondents agreed with the statement in regard to each of the other four programs, while between 14% and 20.5% were neutral and 4% to 10% disagreed. This shows that most of the parents participating in each of the programs thought the programs provided them with skills and resources to help them help their child with math. Of all five programs, Everyday Math Online Tools and Games was noted by the highest percentage of parents (81.7%) to have provided them with skills and resources to assist them in helping their child. Percentages of parent responses

agreeing that the program provided them with skills and resources to assist them in helping their child for each of the other four programs ranged from 71% to 77%.

Table 16

*Frequency and Percent of Parent Responses to Participation in Each Program Gave Parents Skills and Resources*

	Everyday Math Online Tools and Games	Star Math Reports/Home Connect from Renaissance Learning	HomeworkNOW	Study Island	Family Math Nights
Gave parents skills and resources	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Strongly disagree	3 (0.9%)	6 (1.9%)	24 (5.9%)	10 (2.3%)	7 (3.7%)
Disagree	12 (3.4%)	12 (3.8%)	16 (4.0%)	20 (4.7%)	7 (3.7%)
Neutral	49 (14.1%)	65 (20.5%)	74 (18.3%)	70 (16.4%)	34 (18.1%)
Agree	209 (60.1%)	164 (51.7%)	211 (52.2%)	237 (55.5%)	93 (49.5%)
Strongly agree	75 (21.6%)	70 (22.1%)	79 (19.6%)	90 (21.1%)	47 (25.0%)
Total	348 (100.0%)	317 (100.0%)	404 (100.0%)	427 (100.0%)	188 (100.0%)

The third statement parents responded to in the Parent Survey was, “Participation in this program made me more confident in helping my child with math.” Table 17 shows the results of the frequency and percent of parent responses for this statement for each of the five programs. In each of the programs, the majority of the parents agreed with this statement. Parents reported gaining more confidence in helping their child with math by participating in the programs. For each of the programs, about 20% of the parents were neutral. Percentages of parents who disagreed ranged from about 5% to 12%. The program that had the highest percentage of parents in agreement (75.6%) was Everyday Math Online Tools and Games. An extremely close second

was Family Math Nights, with 75.5% of the parents stating that Family Math Nights boosted their confidence in helping them help their child with math. Although Family Math Nights were not well-attended, the majority of the parents who did attend gained more confidence in helping their child with math than did those who participated in Star Math Reports/Home Connect from Renaissance Learning, HomeworkNOW, or Study Island. HomeworkNOW was cited as having the lowest percentage of parents agreeing with the statement at 66.4%. Nonetheless, parent responses indicated that most parents agreed that all of the programs increased their confidence in helping their child with math.

Table 17

*Frequency and Percent of Parent Responses to Participation in Each Program Gave Parents More Confidence in Helping Child with Math*

	Everyday Math Online Tools and Games	Star Math Reports/Home Connect from Renaissance Learning	HomeworkNOW	Study Island	Family Math Nights
Gave parents more confidence	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Strongly disagree	3 (0.9%)	5 (1.6%)	24 (5.9%)	12 (2.8%)	7 (3.7%)
Disagree	14 (4.0%)	15 (4.7%)	24 (5.9%)	23 (5.3%)	6 (3.2%)
Neutral	68 (19.5%)	64 (20.2%)	88 (21.7%)	82 (19.1%)	33 (17.6%)
Agree	181 (52.0%)	160 (50.5%)	187 (46.2%)	216 (50.2%)	95 (50.5%)
Strongly agree	82 (23.6%)	73 (23.0%)	82 (20.2%)	97 (22.6%)	47 (25.0%)
Total	348 (100.0%)	317 (100.0%)	405 (100.0%)	430 (100.0%)	188 (100.0%)

The final statement parents were asked to respond to for each program was, “Participation in this program helped me understand the school’s math curriculum and the

expectations of my child in math.” Table 18 illustrates the frequency and percent of parent responses to that statement for each of the programs. Between 73% and 80% of the parents agreed that the program helped them understand the school’s math curriculum and the expectations of their child in math. For each program, between 15% and 20% of parents reported they were neutral. These results indicated that most parents agreed that the programs helped them understand the school’s math curriculum and what was expected from their child in math. The largest percent of parents (79.3%) reported that Everyday Math Online Tools and Games helped them understand the school’s math curriculum and the expectations of their children in math.

Table 18

*Frequency and Percent of Parent Responses to Participation in Each Program Helped Parents Understand Math Curriculum and Expectations of Child in Math*

	Everyday Math Online Tools and Games	Star Math Reports/Home Connect from Renaissance Learning	HomeworkNOW	Study Island	Family Math Nights
Helped understand math curriculum and expectations of child in math	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Strongly disagree	4 (1.1%)	5 (1.6%)	26 (6.4%)	9 (2.1%)	7 (3.7%)
Disagree	9 (2.6%)	13 (4.1%)	21 (5.2%)	15 (3.5%)	5 (2.7%)
Neutral	59 (16.9%)	62 (19.6%)	61 (15.1%)	71 (16.5%)	35 (18.6%)
Agree	183 (52.4%)	158 (49.8%)	205 (50.6%)	234 (54.4%)	91 (48.4%)
Strongly agree	94 (26.9%)	79 (24.9%)	92 (22.7%)	101 (23.5%)	50 (26.6%)
Total	349 (100.0%)	317 (100.0%)	405 (100.0%)	430 (100.0%)	188 (100.0%)



## **Summary of Descriptive Statistics Results**

An analysis of the descriptive statistics revealed noteworthy findings. It was found that a significant number of parents are not participating in the five math interventions strategies. Between almost 35% to about 70% of the parents did not participate in each program. Study Island had the most parent participation and Family Math Nights had the least. Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning were found by the highest percentage of parents (about 93%) to be helpful. HomeworkNOW was used by the most parents on a daily basis. In regard to all four survey items with statements, parent responses indicated that Everyday Math Online Tools and Games received the highest percent of parents in agreement with three of them. They are “Participation in this program improved my understanding of math which helped me help my child”; “Participation in this program gave me skills and resources to help me help my child with math”; and “Participation in this program helped me understand the school’s math curriculum and the expectations of my child in math.” Everyday Math Online Tools and Games (75.6%) and Family Math Nights (75.5%) both had the highest percentages of parents in agreement to the statement, “Participation in this program made me more confident in helping my child with math.” Even though Family Math Nights had the least parent participation, results indicated that the majority of the parents who did participate benefitted from the program.

## **Chi-Square Analyses**

In order to determine if there is an association between parents’ participation in the five math intervention strategies and demographics reported by parents, a chi-square test for independence was performed. The number of parents who said they participated in and those who said they did not participate in each program were analyzed with the reported school the

child attends, the grade of the child, the gender of the parent, the race or ethnicity of the parent, and the parent’s marital status.

A chi-square test for independence was performed to determine if there is a statistically significant association between whether the parents participated in or did not participate in Everyday Math Online Tools and Games and the child’s school and grade as well as the parent’s gender, race or ethnicity, and marital status. The significance level was set at  $p < .05$ .

A chi-square test for independence indicated an association between parents’ participation in Everyday Math Online Tools and Games and the school the child attends,  $\chi^2(4, n = 683) = 31.941, p < .001$ . Results are presented in Table 19.

Table 19

*Chi-Square Analysis of Parents’ Participation in Everyday Math Online Tools and Games by School*

Participated in Everyday Math Online Tools and Games											
School A ( $n = 161$ )		School B ( $n = 82$ )		School C ( $n = 141$ )		School D ( $n = 192$ )		School E ( $n = 107$ )		$\chi^2(1)$	$p$
$n$	%	$n$	%	$n$	%	$n$	%	$n$	%		
102	63.4	57	69.5	52	36.9	94	49	58	54.2	31.941	<.001

A chi-square test for independence indicated no association between parents’ participation in Everyday Math Online Tools and Games and the grade of the child,  $\chi^2(5, n = 678) = 3.902, p = .564$ . A chi-square test for independence indicated an association between parents’ participation in Everyday Math Online Tools and Games and parents’ gender,  $\chi^2(1, n = 662) = 6.373, p < .05$ . Results are shown in Table 20.

Table 20

*Chi-Square Analysis of Male and Female Parents' Participation in Everyday Math Online Tools and Games*

Participated in Everyday Math Online Tools and Games					
Male parents ( <i>n</i> = 195)		Female parents ( <i>n</i> = 467)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%		
117	60	230	49.3	6.373	.012

A chi-square test for independence indicated an association between parents' participation in Everyday Math Online Tools and Games and parents' race or ethnicity,  $\chi^2(4, n = 674) = 18.547, p < .001$ . Table 21 displays this data.

Table 21

*Chi-Square Analysis of Parents' Participation in Everyday Math Online Tools and Games by Race or Ethnicity*

Participated in Everyday Math Online Tools and Games											
African American ( <i>n</i> = 42)		Asian American ( <i>n</i> = 220)		Latino–Hispanic ( <i>n</i> = 298)		Caucasian ( <i>n</i> = 92)		Other ( <i>n</i> = 22)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
18	42.9	134	60.9	162	54.4	36	39.1	7	31.8	18.547	.001

A chi-square test for independence indicated no association between parents' participation in Everyday Math Online Tools and Games and the marital status of the parents,  $\chi^2(2, n = 675) = 5.397, p = .067$ .

A chi-square test for independence was conducted to establish if there is a statistically significant association between whether the parents participated in or did not participate in Star Math Reports/Home Connect from Renaissance Learning and the child's school and grade as

well as the parent’s gender, race or ethnicity, and marital status. The significance level was set at  $p < .05$ .

A chi-square test for independence indicated an association between parents’ participation in Star Math Reports/Home Connect from Renaissance Learning and the school the child attends,  $\chi^2(4, n = 670) = 30.896, p < .001$ . Results are displayed in Table 22.

Table 22

*Chi-Square Analysis of Parents’ Participation in Star Math Reports/Home Connect from Renaissance Learning by School*

Participated in Star Math Reports/Home Connect from Renaissance Learning											
School A ( $n = 160$ )		School B ( $n = 76$ )		School C ( $n = 141$ )		School D ( $n = 190$ )		School E ( $n = 103$ )		$\chi^2(1)$	$p$
$n$	%	$n$	%	$n$	%	$n$	%	$n$	%		
90	56.3	53	69.7	48	34	84	44.2	52	50.5	30.896	<.001

A chi-square test for independence indicated no association between parents’ participation in Star Math Reports/Home Connect from Renaissance Learning and the grade of the child,  $\chi^2(5, n = 665) = 7.452, p = .189$ . A chi-square test for independence indicated an association between parents’ participation in Star Math Reports/Home Connect from Renaissance Learning and parents’ gender,  $\chi^2(1, n = 649) = 4.709, p < .05$ . Results are displayed in Table 23.

Table 23

*Chi-Square Analysis of Male and Female Parents' Participation in Star Math Reports/Home Connect from Renaissance Learning*

Participated in Star Math Reports/Home Connect from Renaissance Learning					
Male parents ( <i>n</i> = 191)		Female parents ( <i>n</i> = 458)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%		
105	55	209	45.6	4.709	.030

A chi-square test for independence indicated an association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and parents' race or ethnicity,  $\chi^2(4, n = 661) = 10.902, p < .05$ . Table 24 includes the results.

Table 24

*Chi-Square Analysis of Parents' Participation in Star Math Reports/Home Connect from Renaissance Learning by Race or Ethnicity*

Participated in Star Math Reports/Home Connect from Renaissance Learning											
African American ( <i>n</i> = 42)		Asian American ( <i>n</i> = 214)		Latino–Hispanic ( <i>n</i> = 291)		Caucasian ( <i>n</i> = 92)		Other ( <i>n</i> = 22)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
20	47.6	121	56.5	139	47.8	35	38	8	36.4	10.902	.028

A chi-square test for independence indicated no association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the marital status of the parents,  $\chi^2(2, n = 662) = 5.905, p = .052$ .

To establish if there is a statistically significant association between whether the parents participated in or did not participate in HomeworkNOW and the child's school and grade as well

as the parent's gender, race or ethnicity, and marital status, a chi-square test for independence was used. The significance level was set at  $p < .05$ .

A chi-square test for independence indicated an association between parents' participation in HomeworkNOW and the school the child attends,  $\chi^2(4, n = 673) = 38.106, p < .001$ . Results are displayed in Table 25.

Table 25

*Chi-Square Analysis of Parents' Participation in HomeworkNOW by School*

Participated in HomeworkNOW											
School A ( $n = 161$ )		School B ( $n = 75$ )		School C ( $n = 142$ )		School D ( $n = 190$ )		School E ( $n = 105$ )		$\chi^2(1)$	$p$
$n$	%	$n$	%	$n$	%	$n$	%	$n$	%		
112	69.6	54	72	57	40.1	128	67.4	64	61	38.106	<.001

A chi-square test for independence indicated an association between parents' participation in HomeworkNOW and the grade of the child,  $\chi^2(5, n = 668) = 29.117, p < .001$ .

Table 26 shows these results.

Table 26

*Chi-Square Analysis of Parents' Participation in HomeworkNOW by Child's Grade*

Participated in HomeworkNOW													
Grade 1 ( $n = 91$ )		Grade 2 ( $n = 138$ )		Grade 3 ( $n = 135$ )		Grade 4 ( $n = 152$ )		Grade 5 ( $n = 147$ )		Multiple grades ( $n = 5$ )		$\chi^2(1)$	$p$
$n$	%	$n$	%	$n$	%	$n$	%	$n$	%	$n$	%		
41	45.1	70	50.7	87	64.4	105	69.1	106	72.1	4	80	29.117	<.001

A chi-square test for independence indicated no association between parents' participation in HomeworkNOW and parents' gender,  $\chi^2(1, n = 652) = .495, p = .482$ . A chi-

square test for independence indicated an association between parents' participation in HomeworkNOW and parents' race or ethnicity,  $\chi^2(4, n = 663) = 21.938, p < .001$ . The outcomes are presented in Table 27.

Table 27  
*Chi-Square Analysis of Parents' Participation in HomeworkNOW by Race or Ethnicity*

Participated in HomeworkNOW										
African American ( <i>n</i> = 42)		Asian American ( <i>n</i> = 213)		Latino–Hispanic ( <i>n</i> = 292)		Caucasian ( <i>n</i> = 94)		Other ( <i>n</i> = 22)		
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	$\chi^2(1)$
23	54.8	147	69	181	62	51	54.3	5	22.7	21.938
										<i>p</i>
										<.001

A chi-square test for independence indicated no association between parents' participation in HomeworkNOW and the marital status of the parents,  $\chi^2(2, n = 665) = 1.669, p = .434$ .

To determine if there is a statistically significant association between whether the parents participated in or did not participate in Study Island and the child's school and grade as well as the parent's gender, race or ethnicity, and marital status, a chi-square test for independence was utilized. The significance level was set at  $p < .05$ .

A chi-square test for independence indicated an association between parents' participation in Study Island and the school the child attends,  $\chi^2(4, n = 671) = 20.576, p < .001$ . The outcomes are presented in Table 28.

Table 28

*Chi-Square Analysis of Parents' Participation in Study Island by School*

Participated in Study Island											
School A ( <i>n</i> = 159)		School B ( <i>n</i> = 76)		School C ( <i>n</i> = 141)		School D ( <i>n</i> = 190)		School E ( <i>n</i> = 105)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
116	73	56	73.7	71	50.4	127	66.8	68	64.8	20.576	<.001

A chi-square test for independence indicated an association between parents' participation in Study Island and the grade of the child,  $\chi^2(5, n = 666) = 19.933, p < .001$ . Table 29 shows this data.

Table 29

*Chi-Square Analysis of Parents' Participation in Study Island by Child's Grade*

Participated in Study Island													
Grade 1 ( <i>n</i> = 90)		Grade 2 ( <i>n</i> = 137)		Grade 3 ( <i>n</i> = 135)		Grade 4 ( <i>n</i> = 153)		Grade 5 ( <i>n</i> = 146)		Multiple grades ( <i>n</i> = 5)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
48	53.3	76	55.5	90	66.7	110	71.9	108	74	4	80	19.93	.001

A chi-square test for independence indicated no association between parents' participation in Study Island and parents' gender,  $\chi^2(1, n = 650) = .123, p = .726$ . A chi-square test for independence indicates there is an association between parents' participation in Study Island and parents' race or ethnicity,  $\chi^2(4, n = 661) = 10.478, p < .05$ . The results are presented in Table 30.



Table 30

*Chi-Square Analysis of Parents' Participation in Study Island by Race or Ethnicity*

Participated in Study Island										
African American ( <i>n</i> = 42)		Asian American ( <i>n</i> = 212)		Latino–Hispanic ( <i>n</i> = 291)		Caucasian ( <i>n</i> = 94)		Other ( <i>n</i> = 22)		
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	$\chi^2(1)$
22	52.4	140	66	199	68.4	64	68.1	9	40.9	10.478
										<i>p</i>
										.033

A chi-square test for independence indicated an association between parents' participation in Study Island and the marital status of the parents,  $\chi^2(2, n = 663) = 10.122, p < .05$ . The outcomes are shown in Table 31.

Table 31

*Chi-Square Analysis of Parents' Participation in Study Island by Marital Status*

Participated in Study Island							
Married ( <i>n</i> = 543)		Divorced ( <i>n</i> = 35)		Single ( <i>n</i> = 85)			
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	$\chi^2(1)$	<i>p</i>
343	63.2	28	80	66	77.6	10.122	.006

A chi-square test for independence was performed to establish if there is a statistically significant association between whether the parents participated in or did not participate in Family Math Nights and the child's school and grade as well as the parent's gender, race or ethnicity, and marital status. The significance level was set at  $p < .05$ .

A chi-square test for independence indicated an association between parents' participation in Family Math Nights and the school the child attends,  $\chi^2(4, n = 644) = 47.890, p < .001$ . Table 32 includes this data.

Table 32

*Chi-Square Analysis of Parents' Participation in Family Math Nights by School*

Participated in Family Math Nights											
School A ( <i>n</i> = 151)		School B ( <i>n</i> = 74)		School C ( <i>n</i> = 136)		School D ( <i>n</i> = 179)		School E ( <i>n</i> = 104)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
50	33.1	45	60.8	21	15.4	55	30.7	27	26	47.890	<.001

A chi-square test for independence indicated no association between parents' participation in Family Math Nights and the grade of the child,  $\chi^2(5, n = 640) = 7.628, p = .178$ . A chi-square test for independence indicated no association between parents' participation in Family Math Nights and parents' gender,  $\chi^2(1, n = 624) = 1.925, p = .165$ . A chi-square test for independence indicated an association between parents' participation in Family Math Nights and parents' race or ethnicity,  $\chi^2(4, n = 635) = 13.990, p < .05$ . The results are shown in Table 33.

Table 33

*Chi-Square Analysis of Parents' Participation in Family Math Nights by Race or Ethnicity*

Participated in Family Math Nights											
African American ( <i>n</i> = 42)		Asian American ( <i>n</i> = 204)		Latino–Hispanic ( <i>n</i> = 276)		Caucasian ( <i>n</i> = 92)		Other ( <i>n</i> = 21)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
11	26.2	77	37.7	87	31.5	19	20.7	2	9.5	13.990	.007

A chi-square test for independence indicated an association between parents' participation in Family Math Nights and the marital status of the parents,  $\chi^2(2, n = 636) = 6.833, p < .05$ . The outcomes are presented in Table 34.

Table 34

*Chi-Square Analysis of Parents' Participation in Family Math Nights by Marital Status*

Participated in Family Math Nights							
Married ( <i>n</i> = 521)		Divorced ( <i>n</i> = 33)		Single ( <i>n</i> = 82)		$\chi^2(1)$	<i>p</i>
<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
157	30.1	7	21.2	35	42.7	6.833	.033

**Summary of Chi-Square Analysis**

Results of the chi-square analyses showed that statistically significant associations were found between parents' participation in every math intervention strategy and the school of the child as well as the race or ethnicity of the parent. Statistically significant associations were also noted between parents' participation in Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning and the parents' gender. Other statistically significant associations were found between parents' participation in HomeworkNOW and Study Island and the child's grade and between parent's participation in Study Island and Family Math Nights and the parents' marital status.

No significant associations were found between parents' participation in Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning and Family Math Nights and the child's grade. There were no significant associations between parents' participation in HomeworkNOW, Study Island, and Family Math Nights and the parents' gender. No associations were found between Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, and HomeworkNOW and the parents' marital status.

Findings show there is a relationship between the school the child attends and the parents' race or ethnicity and parent participation in all of the five math programs. Study Island had the most significant associations. It was also found in descriptive statistics to have the most parent participation. Further inquiry and research into these results are warranted, especially that of a qualitative nature.

### **Summary of Parent Comments**

Under each set of questions on the Parent Survey, a space was left for parents to add comments or suggestions. Parents had an opportunity to further explain any of the answers provided to the questions. Out of the almost 700 responses, only 93 parents chose to make a comment. Since the majority of parents chose not to make comments (approximately 87%), caution is given to interpreting the comments of this small sample size (approximately 13%) beyond an anecdotal commentary of the individual parent's personal experience. However, the comments add a rich accompaniment to the study. With that in mind, a summary of comments for each math intervention strategy is presented below.

#### **Comments: Everyday Math Online Tools and Games**

Of participants, 45 parents commented about Everyday Math Online Tools and Games. Of those respondents, four parents who utilized Everyday Math Online Tools and Games stated that it was useful and helpful to them. Four said it was not useful in their circumstances. One of these parents said that Everyday Math Online Tools and Games was not helpful because he or she had a background in math. One parent thought the program could be improved if it contained a scaffolding of topics and evaluations of student progress with explanations of where the child stands in math along with videos to inform parents about each lesson. Of the comments, 13 indicated that parents had difficulty accessing the program, did not use it, were not

aware of it, or wanted more information about the program and how they could be involved with it. One parent thought that it would be helpful if the district reminded parents during the year about these programs by sending home accessibility information. This would also help parents who move into the school system mid-year. It was recommended by a parent that a presentation in the usage of these math intervention strategies be arranged for parents. In order to help parents assist their children, one parent suggested classes for parents be offered and another parent wanted more enhanced tools and opportunities. Many parents in the district did not participate in Everyday Math Online Tools and Games. Parent comments may help school leaders increase participation in this math intervention strategy.

**Comments: Star Math Reports/Home Connect from Renaissance Learning**

There were 20 parents who made comments about Star Math Reports/Home Connect from Renaissance Learning. Parents commented on a range of usage of the program, including receiving reports, being presented at parent–teacher conferences, being used at school, and not participating at all. One parent stated being unaware of this program. This parent wondered why the school is not advertising the program since it is costly for the school to run. There was a request for the school to electronically message information to parents about how to access the program. Providing parents with more information and reminders about the tool may increase parent participation.

Comments written by parents indicated a range of usefulness of Star Math Reports/Home Connect from Renaissance Learning. One parent stated it was advantageous and enjoyable to use the Math Facts in a Flash segment of the program to acquire knowledge of math facts in advanced degrees. One parent said that his or her expectancies of as well as assurance in what is taught in school in mathematics were elevated after seeing the scores of the child’s math

assessments brought home by the child as the program was done in school. The program was of little aid to one parent who had a proficiency in mathematics. One parent wrote that the comprehensive reports were beneficial in knowing how to assist the student better instead of receiving one score. On the other hand, one parent was uncertain that his or her ability to assist his or her child with math was impacted by the information gained from participating in this program. Another did not understand the reports. One parent felt the program did not clearly or correctly inform the parent what the child comprehends in math. Another parent thought that teaching parents how to complete the math activities and giving them additional samples of the way mathematics is currently presented in school would enhance the program.

**Comments: HomeworkNOW**

There were 54 parents who commented on the HomeworkNOW program. HomeworkNOW was credited in parent comments to be a terrific avenue to be conversant about what is happening at school. Parents used the program to keep informed of homework assignments, especially when their children forgot them; to get tools and emails from educators, to correspond back and forth with the child's teacher, and to keep track of happenings and announcements. Teachers who use HomeworkNOW post assignments and resources, as well as links to related information and online sites for parents to access that parents found to be very beneficial. Of the parents who commented on HomeworkNOW, 24 said it was a helpful and good program. However, eight did not know what HomeworkNOW was or find it specifically helpful in math. Parents mentioned the program's usefulness depended on how the program was utilized and updated by the teacher. There were 15 parents who thought the program was not updated or used regularly. Two parents stated they did not use the program, while two parents requested that additional information about HomeworkNOW be given to parents. Comments

show that HomeworkNOW is a useful resource to parents. When used consistently by teachers, parents gained by accessing this math intervention strategy. If all teachers can regularly post relevant math tools to aid parents in helping their children with math, it can be beneficial. School leaders can promote the use of HomeworkNOW to encourage more parent participation.

**Comments: Study Island**

There were 50 parents who commented about Study Island. About 14 of the parent comments indicated it was enjoyed by children, a good avenue for teaching children, a great resource, and/or it improved academic achievement. One parent found that what was being presented in school was reinforced through Study Island. About 10 of the parents said they used the program during the summer, and two parents mentioned that this helped prepare their youngsters for the next grade and kept the children academically involved.

One parent said to increase his or her child's skills to manage challenges in math and strengthen mathematical understanding, Study Island was a great resource. This parent went on to state how it benefited him or her as a parent, increasing his or her self-assurance in assisting his or her children while strengthening his or her pedagogy in mathematics. One parent found it beneficial to his or her child, but the parent had a competency in math and did not need Study Island to help the child. Another parent could see what his or her child had difficulty with and really liked Study Island. On the other hand, two parents stated they did not like the program. One disliked the program which he or she felt was frustrating for his or her children. One parent said that he or she was not aware of any resources in Study Island to help teach parents how to aid their children, and a few parents said the program was used only at school. One parent thought that the way math is being taught in school is complicated and found more assistance on YouTube and Google than from any of the math intervention strategies surveyed. One parent

found Study Island to be a good resource, but for learning how to aid his or her children in math and get to know what is taught in math this parent found Khan academy more beneficial. This survey helped one parent feel more aware of his or her lack of knowledge about the school's math program and appreciative of the information.

About seven parents found Study Island difficult to access. Five parents said they did not participate. Two parents were unfamiliar with the program. One parent felt there was not enough ongoing training in it for parents. To obtain and retain participation of all parents in Study Island, school administrators can present parents with ongoing information regarding this resource.

### **Comments: Family Math Nights**

There were 32 parents who commented about Family Math Nights. One parent who participated in a Family Math Night would like to see them run more frequently and stated it was enjoyable and collaborative with the children. Another parent said that he or she gained a lot of information from participating and thought it was enjoyable as well. Another parent said it was perfect for community involvement. A parent noted that his or her knowledge of math was enhanced beyond what he or she acquired many years ago and was very delighted at seeing his or her child's performance at Family Math Night. This parent experienced an elevated awareness of the math expectancies of the child and assurance of how math is taught in the school. One family attempted to do the activities and skills learned at the Family Math Night at home, but found they did not have the time for anything other than the homework the students were assigned. This parent liked attending Family Math Night and was very satisfied seeing all that the children were accomplishing in school during this program.



Of the 32 parents who commented, 11 indicated that they were unaware of Family Math Nights, two said it was not offered for their children, and an additional six said they did not attend. Being new to the district mid-year, one of these parents desired information about all of the district's family involvement programs because he or she did not know about Family Math Nights. Another parent stated that since older siblings assisted their younger children with mathematics, they did not attend Family Math Nights. One parent was unaware of the aspects that related to informing and aiding parents and thought the programs were for children only. This parent thought it would be helpful if the schools communicate with parents about the resources available. A parent was grateful for the district offering this program, but preferred personal collaboration with the child's teacher for assistance. Making parents more aware of and how to access the programs offered at the school on a continuous basis may enhance parent participation rates.

Information gleaned from the parent surveys shows that parents found each math intervention strategy to be helpful, despite some that disagreed. It was noted that parents reported experiencing accessibility issues for some of the programs, did not use them, were not aware of them, and wanted more information about them. This information may provide insight as to why such a significant number of parents are not participating in each program. Further research, especially that of a qualitative nature, may provide more insight into this concern. Nonetheless, most of these issues can easily be remedied by actions taken by school administration.

### **Summary**

In this chapter, the results of analyses were provided. The outcomes of descriptive statistics conveyed that a significant number of parents are not participating in the five math

intervention strategies. A possibility of why this may be has been revealed in the parent comments. Parents stated that they experienced accessibility issues for some of the programs, were not aware of them, and wanted more information about them.

Of those parents who participated in the programs, approximately 90% found each one to be helpful. Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning were identified as the most helpful. Study Island was the program that had the most parent participation of the five math intervention strategies. Parents reported using Study Island over the summer as well as throughout the school year, which may contribute to Study Island being the most-used program. HomeworkNOW was utilized by the most parents on a daily basis, which makes sense due to the nature of the program. Parents can access daily homework assignments, communicate with teachers on a regular basis, and gain access to various resources and tools to assist them. Family Math Nights had the least parent participation, yet the majority of the parents who participated found the program to be helpful.

Out of the four survey items to which parents could respond to statements regarding use of each program, Everyday Math Online Tools and Games received the highest percentage of parents in agreement to three of them. The statements were “Participation in this program improved my understanding of math which helped me help my child”; “Participation in this program gave me skills and resources to help me help my child with math”; and “Participation in this program helped me understand the school’s math curriculum and the expectations of my child in math.” Everyday Math Online Tools and Games (75.6%) and Family Math Nights (75.5%) had the highest percentages of parents who agreed with the statement, “Participation in this program made me more confident in helping my child with math.”

Chi-square analyses revealed statistically significant associations between parents' participation in each five of the programs and the school the child attends as well as the parents' race or ethnicity. Statistically significant associations were also found between parents' participation in Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning and the parents' gender; between parents' participation in HomeworkNOW and Study Island and the child's grade; and between parents' participation in Study Island and Family Math Nights and the parents' marital status. Study Island had the most significant associations, and it was also found to have the most parent participation based on descriptive statistics.

Parents' comments indicated that parents found each math intervention strategy to be helpful, despite some that disagreed. Parents reported accessibility problems for some of the programs. Some parents did not use the math intervention strategies, were not aware of them, and desired more information about them.

Conclusions and implications are discussed in Chapter 5. Additionally, recommendations for future research are included.

## CHAPTER 5

### SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

This study included an examination of the data obtained from the Parent Surveys, analyses of the data, and interpretation and description of the findings. The data from each research question was evaluated. A descriptive analysis was executed. Tables of outcomes were displayed. Results showed the frequency and percent of how helpful parents indicated their participation was in increasing their ability to assist their child in math and how often parents participated in each strategy. A chi-square test for independence was used to determine if there was an association between whether or not parents participated in each math program and the child's school, the child's grade, parent's gender, parent's race or ethnicity, and parent's marital status. Statistical significance was set at  $p < .05$ . Results of these analyses were presented in Chapter 4.

#### **Summary of Findings**

Information gleaned from the Parent Surveys and related analyses informed the answers to the research questions. Results are summarized and reported for each research question.

#### **Results for Research Question 1**

The math intervention strategy that had the most parent participation was Study Island. Out of 672 parents who responded to the survey question, 439 (65.3%) stated they participated, 233 (34.7%) reported that they did not participate, and 50 of the 694 parents who completed the survey made comments about Study Island. About 28% of the parent comments indicated it was a helpful resource while some parents did not agree, and others had difficulty accessing the program. About 20% stated that they used the program over the summer. One parent stated that

Study Island was beneficial in increasing his or her self-assurance in assisting his or her child and strengthened the parent's as well as the child's pedagogy in mathematics.

## **Results for Research Question 2**

Of the five math intervention strategies, respondents identified Everyday Math Online Tools and Games (93.4%) and Star Math Reports/Home Connect from Renaissance Learning (93%) as being the most helpful math intervention strategies. Out of the 358 respondents to the question for Everyday Math Online Tools and Games, the vast majority (93.4%) found the program helpful in increasing their ability to help their child with math. Similar results were observed for Star Math Reports/Home Connect from Renaissance Learning with 93% of the parents reporting it to be a helpful program.

Everyday Math Online Tools and Games received the highest percentage of parents in agreement to three of the four survey items of which parents responded to statements regarding use of each program. They were "Participation in this program improved my understanding of math which helped me help my child"; "Participation in this program gave me skills and resources to help me help my child with math"; and "Participation in this program helped me understand the school's math curriculum and the expectations of my child in math." Everyday Math Online Tools and Games (75.6%) and Family Math Nights (75.5%) had the highest percentages of parents in agreement to "Participation in this program made me more confident in helping my child with math." Out of 694 parents who completed the survey, 45 commented about Everyday Math Online Tools and Games. Four parents mentioned that Everyday Math Online Tools and Games was a helpful resource.

Of the respondents, 20 made comments about Star Math Reports/Home Connect from Renaissance Learning that indicated a range of usefulness. One parent stated that it was

advantageous and enjoyable to use the Math Facts in a Flash segment of the program to acquire knowledge of math facts in advanced degrees. One parent said that his or her expectancies of as well as assurance in what is taught in school in mathematics were elevated after seeing the scores of the child's math assessments brought home by the child as the program was done in school. One parent wrote that the comprehensive reports were beneficial in knowing how to assist the student better instead of receiving one score.

### **Results for Research Question 3**

In order to determine if there was an association between parents' participation in the five math intervention strategies and demographics reported by parents, a chi-square test for independence was conducted. The number of parents who said they participated in and those who said they did not participate in each program was analyzed with the reported school the child attends, the grade of the child, the gender of the parent, the race or ethnicity of the parent, and the parent's marital status. The results for each subsidiary research question are discussed below.

### **Results for Subsidiary Research Question 3a**

A chi-square test for independence was performed to determine if there was a statistically significant association between parents' participation in Everyday Math Online Tools and Games and the child's school and grade as well as the parent's gender, race or ethnicity, and marital status. The significance level was set at  $p < .05$ . A chi-square test for independence indicated that there is an association between parents' participation in Everyday Math Online Tools and Games and the school the child attends; between parents' participation in Everyday Math Online Tools and Games and parents' gender; and between parents' participation in Everyday Math Online Tools and Games and parents' race or ethnicity. A chi-square test for independence

indicated no association between parents' participation in Everyday Math Online Tools and Games and the grade of the child or between parents' participation in Everyday Math Online Tools and Games and the marital status of the parents.

### **Results for Subsidiary Research Question 3b**

A chi-square test for independence was conducted to establish if there was a statistically significant association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the child's school and grade as well as the parent's gender, race or ethnicity, and marital status. The significance level was set at  $p < .05$ . A chi-square test for independence indicated there is an association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the school the child attends; between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and parents' gender; and between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and parents' race or ethnicity. A chi-square test for independence indicated that there is no association between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the grade of the child or between parents' participation in Star Math Reports/Home Connect from Renaissance Learning and the marital status of the parents.

### **Results for Subsidiary Research Question 3c**

To establish if there is a statistically significant association between parents' participation in HomeworkNOW and the child's school and grade as well as the parent's gender, race or ethnicity, and marital status, a chi-square test for independence was conducted. The significance level was set at  $p < .05$ . A chi-square test for independence indicated an association between parents' participation in HomeworkNOW and the school the child attends; between parents'

participation in HomeworkNOW and the grade of the child; and between parents' participation in HomeworkNOW and parents' race or ethnicity. A chi-square test for independence indicated no association between parents' participation in HomeworkNOW and parents' gender or between parents' participation in HomeworkNOW and the marital status of the parents.

### **Results for Subsidiary Research Question 3d**

To determine if there is a statistically significant association between parents' participation in Study Island and the child's school and grade as well as the parent's gender, race or ethnicity, and marital status a chi-square test for independence was conducted. The significance level was set at  $p < .05$ . A chi-square test for independence indicated an association between parents' participation in Study Island and the school the child attends; between parents' participation in Study Island and the grade of the child; between parents' participation in Study Island and parents' race or ethnicity; and between parents' participation in Study Island and the marital status of the parents. A chi-square test for independence indicated no association between parents' participation in Study Island and parents' gender.

### **Results for Subsidiary Research Question 3e**

A chi-square test for independence was performed to establish if there is a statistically significant association between parents' participation in Family Math Nights and the child's school and grade as well as the parent's gender, race or ethnicity, and marital status. The significance level was set at  $p < .05$ . A chi-square test for independence indicated an association between parents' participation in Family Math Nights and the school the child attends; between parents' participation in Family Math Nights and parents' race or ethnicity; and between parents' participation in Family Math Nights and the marital status of the parents. A chi-square test for independence indicated no association between parents' participation in Family Math Nights and



the grade of the child or between parents' participation in Family Math Nights and parents' gender.

### **Conclusions**

Results indicated that the majority of the parents found all five math intervention strategies helpful in increasing their ability to help their child in math. About 90% of parents responding to the questions for each program found that participating in the math intervention strategy was helpful in increasing their abilities to help their children with math. Of the five math intervention strategies, respondents identified Everyday Math Online Tools and Games (93.4%) and Star Math Reports/Home Connect from Renaissance Learning (93%) as the most helpful.

Results revealed that out of the five math intervention strategies, Study Island had the most parent participation. Approximately 65% of the parents responding to the question reported participating in the program. Parents stated that they used the program over the summer as well as throughout the school year.

Parent responses to four additional survey items gave more insight into their participation in each program. Analyses showed that 70% to 80% of the parents agreed that their understanding of math improved by participating in the math programs which helped them help their children. Everyday Math Online Tools and Games had the highest percent of parents in agreement at a little over 80%. Between 71% and 82% of the parents agreed that participation in the programs gave them skills and resources to help them help their children with math. Everyday Math Online Tools and Games had the highest percentage (almost 82%) of parents in agreement. Everyday Math Online Tools and Games (75.6%) and Family Math Nights (75.5%) had the highest percentages of parents agreeing that participation in the program made them

more confident in helping their child with math. Between 73% and 80% of the parents agreed that participation in the program helped them understand the school's math curriculum and expectations of their child in math. Everyday Math Online Tools and Games received the highest percent of parents (79.3%) in agreement to this statement. Everyday Math Online Tools and Games had the highest percent of parents responding to three of the four survey items. Everyday Math Online Tools and Games (75.6%) and Family Math Nights (75.5%) had the highest percentages of parents agreeing with the fourth survey item.

Data from the Parent Surveys showed that among the five math intervention strategies studied there were between about 35% to 70% of the parent responses for each program indicating parents did not participate in the program. For Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning, about half of the parents participated and about half did not participate. For HomeworkNOW, about 40% of the parents said they did not participate. Study Island was the most-used program by parents (65.3%). Only about 35% of the parents noted they did not participate in Study Island. Parent comments indicated that some parents experienced accessibility issues for some of the programs, did not use them, were not aware of them, and wanted more information about them. This information may provide a view into why such a significant number of parents did not participate in each program.

Family Math Nights had the highest number of parents, or about 69%, who did not participate. This may be because of the nature of the program. Family Math Nights only occur a few nights during the year, primarily at one school, and have been presented on and off for the past 15 years. At times, the focus was on involving Title I families. This may offer insight as to why such a low number of families reported participating in this math intervention strategy.

Despite the low response rate, over 90% of the parents who participated found that Family Math Nights was helpful in increasing their ability to help their child with math.

A chi-square test for independence indicated an association between parents' participation in each of the five math programs and the school the child attends. An association was also indicated between parents' participation in each of the five programs and parents' race or ethnicity. The only other associations noted were between parents' participation in HomeworkNOW and Study Island and the child's grade; between parents' participation in Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning and parents' gender; and between parents' participation in Study Island and Family Math Nights and parents' marital status. Study Island had the most significant associations and was also found to be the program most parents participated in. Further research should be conducted to analyze these associations in more detail; particularly research that is qualitative in nature.

### **Implications**

This study was conducted to find if parents' participation in various school-related math intervention strategies was helpful in increasing parents' abilities to help their children with math. Findings may provide insight to schools, families, and future researchers. School personnel can provide opportunities for parents to participate in these programs that were found to be helpful in increasing parents' abilities to aid their children in math. School law mandates that schools provide "effective" family engagement for parents (ESSA, 2015 Section 1010 [2] Written Policy [E] [D]). Goldman and Booker (2009) pointed out that when parents' self-efficacy is fostered, there is a greater likelihood that they will assist students with math homework. Additionally, parents stated that receiving strategies on how to help their children

increase proficiencies in math would be especially beneficial to them (Learning Heroes, 2016, p. 17). As such, this study's findings can be used to inform local school leaders to guide their funding and procurement of resources toward programs noted as helpful to families.

School-related math intervention programs that parents said increased their efficacy in helping their children with math were found. As parents engage successfully, so do their children. Siddiqui (2011) stated that student achievement is enhanced as parents engage consistently throughout the school-age years. To increase competency in aiding children with math, parents are encouraged to participate in the programs. Previous studies have shown that children succeed at school when their parents are involved (Henderson & Mapp, 2002; Sheldon & Epstein, 2005). Patall et al. (2008) found that students fulfilled tasks assigned by the teachers to be completed at home with less difficulty when families were engaged in the completion of those tasks, which enhanced student success at school. Children will benefit from the help parents can give them to learn math.

This study contributes to existing literature on parent involvement in children's math. This study suggests there are school-related math intervention strategies that parents report as useful in increasing their abilities to help their children in math in a large urban rim school district.

### **Recommendations for Policy and Practice**

There are several indications for policy and practice as a result of this study. The majority of the parents who participated in each program found them beneficial. Results of this study show that school leaders should maintain the use of all of these programs, particularly Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, and Study Island. Young et al. (2013) pointed out that administrators are essential to

the parent engagement process and should utilize various means to involve all families at school. School leaders have an opportunity to involve parents effectively through the use of these five varied math intervention strategies. Van Voorhis et al. (2013) found that despite family demographics, parents are capable of assisting in students' education with assistance from schools and they welcome resources to do so. This study showed that parents found that participating in these math intervention strategies provided by the school to assist them in their role as parents was helpful in increasing their abilities to help their children with math.

However, there is a substantial number of parents that are not taking advantage of these math intervention strategies. School leaders may want to survey teachers and parents to find out why more parents are not involved and make necessary adjustments in current practice to enroll more parents. Some parents stated in the comment section that they were unaware that the programs existed and requested information on how to access the programs. With this in mind, the schools could offer more frequent overviews of and public relations for the math programs which would be helpful for those families who transfer into the school district mid-year. This practice can include showing parents how to access each program and train parents step-by-step how to use the program during meetings with parents, an idea that was suggested by one of the parents in this study. To train parents to aid their children, a few parents asked for more programs like these. The district may want to pursue additional math programs for parents as well as similar intervention strategies for parents in subjects other than math.

Through chi-square analyses, associations were found between parents' participation in every math intervention strategy and the school the child attends. Associations were also found between parents' participation in every math intervention strategy and the parents' race or ethnicity. Other associations were found between parents' participation in HomeworkNOW and

Study Island and the child's grade; between parents' participation in Everyday Math Online Tools and Games and Star Math Reports/Home Connect from Renaissance Learning and parents' gender; and between parents' participation in Study Island and Family Math Nights and parents' marital status. Study Island, which had the most parent participation, had the most significant associations. This tells school leaders that further research may want to be conducted to analyze these associations in more detail; particularly through research that is qualitative in nature.

### **Recommendations for Future Research**

This study was an examination of whether parents' participation in school-related math intervention strategies was helpful in increasing their abilities to help their children in math in this climate of ever-changing math curricula. Implications for further research include the following:

- In an era when students throughout the nation are not showing significant growth in mathematics (Goforth et al., 2014; Nation's Report Card, n.d.a), most of the percentages of students' scores on the PARCC 2015-2016 in this school district in Grades 3–5 are significantly higher than state averages. That means these students are doing better than their typical peers throughout the state. Because no direct correlation could be established between parent participation in these math intervention strategies and students' test scores in this study, this warrants further exploration to see if any of this can be explained by parents' participation in the district's math intervention strategies. Future research is needed to study whether or not parent involvement in these five math intervention strategies increased student scores on state-wide tests in math and in math achievement in general; particularly for

the children of the parents who indicated the programs were beneficial to elevating their abilities to help their children with math.

- The district spends money on these programs that are underutilized by all the parents. Uncovering the reasons why such a significant number of parents are not participating in the math intervention strategies in this school system can shed light on the strategies to facilitate parents' involvement in their children with math.
- Additional research should be conducted to ascertain if parent participation in math intervention programs impacts parents' proficiencies at the pre-K, kindergarten, and middle and secondary school levels.
- Further information about exactly how and how often parents utilized the skills and knowledge received from participating in these programs could be insightful.
- It would be interesting to know if participation in these strategies made parents want to become more involved with other school activities.
- This study was quantitative in nature and a qualitative design would produce a more in-depth understanding of the topic. Additional data on why and how each program helped or did not help parents could be helpful. More research is needed to explore how various components of each program are used to increase parents' self-efficacy with math.
- Math was the subject of interest in this research. Future researchers may look at parent programs for other subject-specific areas such as reading, language arts, science, and technology.

- This study was conducted in a large urban rim school district. Additional studies should include other geographic and demographic areas such as metropolitan and residential settings.
- A public school system was used for this study. Researchers may want to consider a private or charter school environment in their future research endeavor.
- This researcher did not investigate specific backgrounds of parents that could provide challenges for parents such as previous mathematic ability, level of education, socioeconomic status, language, and time constraints. Future researchers may want to explore whether the backgrounds of parents influence parent involvement.
- This researcher did not look into whether or not specific math curricula have an impact on parent involvement. An analysis of the various math curricula available and determining if they have an effect on parent engagement would be noteworthy.

### **Summary**

This researcher found that parents' participation in Everyday Math Online Tools and Games, Star Math Reports/Home Connect from Renaissance Learning, HomeworkNOW, Study Island, and Family Math Nights was helpful in increasing their abilities to help their children with math. In an age when the math curriculum is ever-changing and becoming increasingly more demanding, this school district is providing effective parent involvement activities which aid parents in helping their children with math. The families in this school district have several math intervention strategies available to them that have been reported to be helpful in increasing parents' competencies to help their children with math.

However, from the data conveyed by parents, it was obvious that a very large number of parents are not participating in each of the programs. The school leaders may want to explore



the reasons for this and make necessary adjustments in publicity and enlistment efforts. Maintaining ongoing communication throughout the year about the availability of each program, the benefits of the programs, and how to access them may be something the schools should further employ. This will address the issues for parents who are new to the district mid-year as well as those who may have misplaced accessibility features such as usernames or passwords.

Generalizations cannot be made for all parents of children in Grades 1 through 5 in similar urban rim school districts because this was not a national sample. However, this study has merit for school administrators and families as well as for empirical research.

## REFERENCES

- Anderson, K. J., & Minke, K. M. (2007, May/June). Parent involvement in education: Toward an understanding of parents' decision making. *The Journal of Education Research, 100*(5), 311–323.
- Baltimore County Public Schools. (n.d.). *BCPS Parent University: Personal growth*. Retrieved from <https://www.bcps.org/parentu/personalGrowth/>
- Bartel, V. B. (2010). Home and school factors impacting parental involvement in a Title I elementary school. *Journal of Research in Childhood Education, 24*(3), 209–228. doi:10.1080/02568543.2010.487401
- Braams, B. (2003, February). *The many ways of arithmetic in UCSMP Everyday Mathematics*. Retrieved from <http://nychold.com/em-arith.html>
- Bronfenbrenner, U. (Ed.). (2005). *Making human beings human: Bioecological perspectives on human development*. Thousand Oaks, CA: Sage.
- Bui, K., & Rush, R. A. (2016). Parental involvement in middle school: Predicting college attendance for first generation students. *Education, 136*(4), 473–489.
- Charlotte-Mecklenburg Schools. (n.d.). *What is Parent University?* Retrieved from <http://www.cms.k12.nc.us/parents/ParentUniv/Pages/WhatIsParentUniversity.aspx>
- College Board. (2011). *SAT trends: Background on the SAT takers in the class of 2011*. Retrieved from [http://media.collegeboard.com/digitalServices/pdf/research/SAT\\_Trends\\_Report\\_9\\_12\\_2011.pdf](http://media.collegeboard.com/digitalServices/pdf/research/SAT_Trends_Report_9_12_2011.pdf)
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Los Angeles, CA: Sage.
- Daniel, G. (2011, May). Family-school partnerships: Towards sustainable pedagogical practice. *Asia-Pacific Journal of Teacher Education, 39*(2), 165–176.
- Domina, T. (2005, July). Leveling the home advantage: Assessing the effectiveness of parental involvement in elementary school. *Sociology of Education, 78*(3), 233–249. <https://doi.org/10.1177/003804070507800303>
- El Nokali, N. E., Bachman, H. J., & Votruba-Drzal, E. (2010). Parent involvement and children's academic and social development in elementary school. *Childhood Development, 81*(3), 988–1005.
- Elementary and Secondary Education Act, H. R. 2362, 89th Cong., 1st sess., Pub. L. No. 89-10 (1965).
- Epstein, J. L. (2005, April). Attainable goals? The spirit and letter of the No Child Left Behind Act on parental involvement. *Sociology of Education, 78*(2), 179–182.

- Epstein, J. L. (2011). *School, family, and community partnerships: Preparing educators and improving schools*. Boulder, CO: Westview Press.
- Epstein, J. L., & Sheldon, S. B. (2002, May/June). Present and accounted for: Improving student attendance through family and community involvement. *The Journal of Educational Research*, *95*(5), 308–318.
- Epstein, J. L., Sanders, M. G., Sheldon, S. B., Simon, B. S., Clark Salinas, K., Rodriguez Jansorn, N., . . . Williams, K. J. (2009). *School, family, and community partnerships: Your handbook for action* (3rd ed.). Thousand Oaks, CA: Corwin Press.
- Every Student Succeeds Act, S. 1177 (114th). (2015).
- Everyday Mathematics. (2018a). *How children learn..* Retrieved from McGraw-Hill Education website: <https://www.mheducation.com/prek-12/program/microsites/MKTSP-TRA15M0.html>
- Everyday Mathematics. (2018b). *Program overview*. Retrieved from McGraw-Hill Education website: <https://www.mheducation.com/prek-12/program/microsites/MKTSP-TRA15M0/program-overview.html>
- Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review*, *13*(1), 1–22.
- Ginsburg, L., Rashid, H., & English-Clarke, T. (2008, June 1). Parents learning mathematics: For their children, from their children, with their children. *Adult Learning*, *19*(3-4), 21–26. Retrieved from <https://doi.org/10.1177/104515950801900305>.
- Go Math! K-8. (n.d.). Retrieved from Houghton Mifflin Harcourt website: <http://www.hmhco.com/shop/education-curriculum/math/elementary-mathematics/go-math-k-8/#features-k-6>
- Goforth, K., Noltemeyer, A., Patton, J., Bush, K. R., & Bergen, D. (2014). Understanding mathematics achievement: an analysis of the effects of student and family factors. *Educational Studies*, *40*(2), 196–214. doi:10.1080/03055698.2013.866890
- Goldman, S., & Booker, A. (2009). Making math a definition of the situation: Families as sites for mathematical practices. *Anthropology & Education Quarterly*, *40*(4), 369–387.
- Griffin, D., & Galassi, J. P. (2010, October). Parent perceptions of barriers to academic success in a rural middle school. *Professional School Counseling*, *14*(1), 87–100.
- Guzdial, M., & Morrison, B. (2016, November 1). Growing computer science education into a STEM education discipline. *Communications of the ACM*, *59*(11), 31–33. doi:10.1145/3000612

- Hall, B. (2007-2018). *The history of curriculum development: 1900-1935*. Retrieved from Timetoast website: <https://www.timetoast.com/timelines/the-history-of-curriculum-development-1900-1935>
- Henderson, A. T., & Mapp, K. L. (2002). *A new wave of evidence: The impact of school, family, and community connections on student achievement. Annual Synthesis 2002*. Austin, TX: Southwest Educational Development Laboratory (SEDL), National Center for Family and Community Connections With Schools.
- Hoang, T. (2010, July). No Child Left Behind: School processes associated with positive changes, collaborative partnership, and principal leadership. *Academic Leadership*, 8(3), 1–8.
- HomeworkNOW Home*. (2018). Retrieved from <http://www.homeworkNOW.com/>
- Hoven, J., & Garelick, B. (2007, November). Singapore Math®: Simple or complex? *Educational Leadership*, 65(3), 28–31.
- Ice, C. L., & Hoover-Dempsey, K. V. (2011). Linking parental motivations for involvement and student proximal achievement outcomes in homeschooling and public schooling settings. *Education and Urban Society*, 43(3), 339–369.
- Johnson, D. (1997, December). Putting the cart before the horse: Parent involvement in the Improving America's Schools Act. *California Law Review*, 85(6), 1757–1801. Retrieved from <http://scholarship.law.berkeley.edu/californialawreview/vol85/iss6/3>
- Jones, C. L. (2011). No Child Left Behind fails the reality test for inner-city schools: A view from the trenches. *Cumberland Law Review*, 40(2), 397–461.
- Kane, T. J., Owens, A. M., Marinell, W. H., Thal, D. R., & Staiger, D. O. (2016, February). *Teaching higher: Educators' perspectives on common core implementation*. Retrieved from <http://www.hmhco.com/~media/sites/home/education/disciplines/mathematics/elementary/go-math/teaching-higher-report.pdf?la=en>
- Lavery, L. E. (2016). What parents still do not know about No Child Left Behind and why it matters. *Journal of Education Policy*, 31(3), 343–361.
- Learning Heroes. (2016). *Parents 2016: Hearts & minds of parents in an uncertain world*. Retrieved from <http://r50gh2ss1ic2mww8s3uvjvq1.wpengine.netdna-cdn.com/wp-content/uploads/2016/07/LearningHeroes-Report-english.pdf>
- Leech, N. L., Barrett, K. C., & Morgan, G. A. (2015). *IBM SPSS for intermediate statistics use and interpretation* (5th ed.). New York, NY: Routledge Taylor & Francis Group.
- Levin, K. A. (2006, March 24). *Study design III: Cross-sectional studies*. doi:10.1038/sj.ebd.6400375

- Manos, M. A. (2009, Spring). Opt to take an active role in your child's education. *Phi Kappa Phi Forum*, 89(1), 22–23.
- Mapp, K. L., & Kuttner, P. J. (2013). *Partners in education: A dual capacity-building framework for family-school partnerships*. Austin, TX: SEDL in collaboration with the U.S. Department of Education.
- Martin, C. (2017, January/February). Libraries as facilitators of coding for all. *Knowledge Quest/Diversity Matters*, 45(3), 46–53.
- Montgomery, D. J. (2005). Communication without harm: Strategies to enhance parent-teacher communication. *Teaching Exceptional Children*, 37(5), 50–55.
- Moreno-Leon, J., Robles, G., & Roman-Gonzalez, M. (2016). Code to learn: Where does it belong in the K-12 curriculum? *Journal of Information Technology Education: Research*, 15, 283–303. Retrieved from <http://www.jite.org/documents/Vol15/JITEv15IIPp053-073Du1950.pdf>.
- Myers, S. M., & Myers, C. B. (2013, Winter). The dynamics of parental involvement in U.S. schools from 1996 to 2007. *Journal of School Public Relations*, 34(1), 74–105.
- Myers, S. M., & Myers, C. B. (2015, March). Family structure and school-based parental involvement: A family resource perspective. *Journal of Family and Economic Issues*, 36(1), 114–131.
- Nation's Report Card. (n.d.a). *2015 Mathematics and Reading Assessments*. Retrieved from [https://www.nationsreportcard.gov/reading\\_math\\_2015/#mathematics?grade=4](https://www.nationsreportcard.gov/reading_math_2015/#mathematics?grade=4)
- Nation's Report Card. (n.d.b). *2015 Mathematics and Reading at Grade 12*. Retrieved from [https://www.nationsreportcard.gov/reading\\_math\\_g12\\_2015/#mathematics](https://www.nationsreportcard.gov/reading_math_g12_2015/#mathematics)
- National Assessment of Educational Progress (NAEP). (2016, April 20). *More about NAEP mathematics*. Retrieved from Institute of Education Sciences (IES), National Center for Education Statistics (NCES) website: <https://nces.ed.gov/nationsreportcard/mathematics/moreabout.aspx>
- National Assessment of Educational Progress (NAEP). (2017, June 2). Retrieved February 25, 2018, from Institute of Education Sciences (IES), National Center for Education Statistics (NCES) website:<https://nces.ed.gov/nationsreportcard/mathematics/>
- New Jersey Core Curriculum Content Standards for Mathematics. (2008, January 9). Retrieved from State of New Jersey Department of Education website: [http://www.nj.gov/education/cccs/2004/s4\\_math.pdf](http://www.nj.gov/education/cccs/2004/s4_math.pdf)
- New Jersey Department of Education. (2015-2016). *PARCC Spring state summary report*. Retrieved from <http://www.state.nj.us/education/schools/achievement/16/parcc/spring/Grade0308.pdf>

- New Jersey Student Learning Standards for Mathematics. (n.d.). Retrieved from State of New Jersey Department of Education website:  
<http://www.nj.gov/education/cccs/2016/math/standards.pdf>
- No Child Left Behind Act of 2001, Public Law 107-110. (2002).
- Noel, A., Stark, P., & Redford, J. (2013). *Parent and family involvement in education, from the National Household Education Surveys program of 2012 (NCES 2013-028)*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://nces.ed.gov/pubsearch>
- North Bellmore School District. (n.d.). *Parent University*. Retrieved from <http://www.northbellmoreschools.org/Page/1275>
- Office of the Press Secretary. (2015, March 23). *Remarks by the President at White House Science Fair*. Retrieved from <https://obamawhitehouse.archives.gov/the-press-office/2015/03/23/remarks-president-white-house-science-fair>
- Okpala, C. O., Okpala, A. O., & Smith, F. E. (2001, November/December ). Parent involvement, instructional expenditures, family socioeconomic attributes, and student achievement. *The Journal of Educational Research*, 95(2), 110–115.
- Patall, E. A., Cooper, H., & Robinson, J. C. (2008, December). Parent involvement in homework: A research synthesis. *Review of Educational Research*, 78(4), 1039–1101. doi:10.3102/0034654308325185
- Pea, R., & Martin, L. (2010). Values that occasion and guide mathematics in the family. *Yearbook of the National Society for the Study of Education*, 109(1), 34–52.
- Pienta, N. J. (2010, May). Innovate to educate. *Journal of Chemical Education*, 87(5), 459.
- Pressman, R. M., Sugarman, D. B., Nemon, M. L., Desjarlais, J., Owens, J. A., & Schettini-Evans, A. (2015). Homework and family stress: With consideration of parents' self confidence, educational level, and cultural background. *The American Journal of Family Therapy*, 297–313. doi:10.1080/01926187.2015.1061407
- Program for International Student Assessment (PISA) (n.d.a). *Overview*. Retrieved from Institute of Education Sciences (IES), National Center for Education Statistics (NCES) website:  
<https://nces.ed.gov/surveys/pisa/>
- Program for International Student Assessment (PISA). (n.d.b). *Selected findings from PISA 2015*. Retrieved from Institute of Education Sciences (IES), National Center for Education Statistics (NCES) website: [https://nces.ed.gov/surveys/pisa/pisa2015/pisa2015highlights\\_1.asp](https://nces.ed.gov/surveys/pisa/pisa2015/pisa2015highlights_1.asp)
- Program for International Student Assessment (PISA). (n.d.c). *Trends in student performance: trends in U.S. performance*. Retrieved from Institute of Education Sciences (IES),

- National Center for Education Statistics (NCES) website: [https://nces.ed.gov/surveys/pisa/pisa2015/pisa2015highlights\\_6.asp#table](https://nces.ed.gov/surveys/pisa/pisa2015/pisa2015highlights_6.asp#table)
- Ravitch, D. (2010). *The death and life of the great American school system*. New York, NY: Basic Books.
- Reeve, E. M. (2015, December-January). STEM thinking! *Technology and Engineering Teacher*, 74(4), 8–16.
- Renaissance. (n.d.a). *Fundamental math and vocabulary practice*. Retrieved from <https://www.renaissance.com/products/practice/in-a-flash/>
- Renaissance. (n.d.b). *Home connect*. Retrieved from <https://www.renaissance.com/products/practice/home-connect/>
- Sanders, M. G. (2008, May/June). How parent liaisons can help bridge the home-school gap. *The Journal of Educational Research*, 101(5), 287–297.
- Shaver, A. V., & Walls, R. T. (1998). Effect of Title I parent involvement on reading and mathematics achievement. *Journal of Research and Development in Education*, 31(2), 90–97.
- Sheldon, S. B., & Epstein, J. L. (2005, March/April). Involvement counts: Family and community partnerships and mathematics achievement. *The Journal of Educational Research*, 98(4), 196–206.
- Siddiqui, J. I. (2011, July-December). Lack of parental involvement: Stress-prone children. *International Journal of Education and Allied Sciences*, 3(2), 43–48.
- Smith, M. (2016, January 30). *Computer science for all*. Retrieved from <https://obamawhitehouse.archives.gov/blog/2016/01/30/computer-science-all>
- Sochacka, N. W., Guyotte, K. W., & Walther, J. (2016, January). Learning together: A collaborative autoethnographic exploration of STEAM (STEM + the Arts) education. *Journal of Engineering Education*, 105(1), 15–42. doi:10.1002/jee.20112
- Staples, K. E., & Diliberto, J. A. (2010, July/August). Guidelines for successful parent involvement: Working with parents of students with disabilities. *Teaching Exceptional Children*, 42(6), 58–63.
- Star Math. (2018a). *Parent report*. Retrieved from Renaissance Learning website: <https://help.renaissance.com/SM/ParentRep>
- Star Math. (2018b). *Reports*. Retrieved from Renaissance Learning website: <https://help.renaissance.com/SM/SMReports>
- State of New Jersey Department of Education. (n.d.). Home. Retrieved from <https://www.state.nj.us/education/>

- Stenmark, J. K., Thompson, V., & Casey, R. (1986). *Family Math*. Berkeley: University of California, Lawrence Hall of Science.
- Stohlmann, M., Moore, T. J., & Roehrig, G. H. (2012). Considerations for teaching integrated STEM education. *Journal of Pre-College Engineering Education Research (J-PEER)*, 2(1), 27–34.
- Study Island. (2017a). *About: Awards*. Retrieved from <http://www.studyisland.com/about/awards>
- Study Island. (2017b). *Products*. Retrieved from <http://www.studyisland.com/products>
- Study Island. (2017c). *Products: Schools*. Retrieved from <http://www.studyisland.com/products/school>
- Suizzo, M.-A., Pahlke, E., Yarnell, L., Chen, K.-Y., & Romero, S. (2014). Home-based parental involvement in young children’s learning across U.S. ethnic groups: Cultural models of academic socialization. *Journal of Family Issues*, 35(2), 254–287.  
doi:10.1177/0192513X12465730
- Tienken, C. H., & Orlich, D. C. (2013). *The school reform landscape: Fraud, myth, and lies*. Lanham, MD: Rowman & Littlefield Education.
- Trends in International Mathematics and Science Study (TIMSS). (2015a). *Selected findings from TIMSS Advanced of 2015*. Retrieved from Institute of Education Sciences (IES), National Center for Education Statistics (NCES) website: [https://nces.ed.gov/timss/timss2015/findings\\_advanced.asp](https://nces.ed.gov/timss/timss2015/findings_advanced.asp)
- Trends in International Mathematics and Science Study (TIMSS). (2015b). *Selected findings from TIMSS 2015*. Retrieved from Institute of Education Sciences (IES), National Center for Education Statistics (NCES) website: <https://nces.ed.gov/timss/timss2015/findings.asp>
- Trends in International Mathematics and Science Study (TIMSS). (n.d.). *Overview*. Retrieved from Institute of Education Sciences (IES), National Center for Education Statistics (NCES) website: <https://nces.ed.gov/timss/>
- U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2015, December). *Primary mathematics intervention report: Singapore Math<sup>®</sup>*. Retrieved from <http://whatworks.ed.gov>
- Ujifusa, A., & Tully, S. (2016, March 22). *ESSA may offer megaphone for parent, community voices*. Retrieved from Education Week website: [http://www.edweek.org/ew/articles/2016/03/23/essa-may-offer-megaphone-for-parent-community.html?\\_ga=2.33335670.954782249.1497217520-717142524.1468347445](http://www.edweek.org/ew/articles/2016/03/23/essa-may-offer-megaphone-for-parent-community.html?_ga=2.33335670.954782249.1497217520-717142524.1468347445)
- Van Voorhis, F. L. (2011). Costs and benefits of family involvement in homework. *Journal of Advanced Academics*, 22(2), 220–249.



- Van Voorhis, F. L., Maier, M. F., Epstein, J. L., & Lloyd, C. M. (2013). *The impact of family involvement on the education of children ages 3 to 8: A Focus on literacy and math achievement outcomes and social-emotional skills*. New York, NY: MDRC. Retrieved from <https://eric.ed.gov/?id=ED545474>.
- Wang, H.-H., Moore, T. J., Roehrig, G. H., & Park, M. S. (2011). STEM integration: Teacher perceptions and practice. *Journal of Pre-College Engineering Education Research (J-PEER)*, 1(2), Article 2. <http://dx.doi.org/10.5703/1288284314636>
- Watson, D. (2011). “Urban, but not too urban”: Unpacking teachers’ desires to teach urban students. *Journal of Teacher Education*, 62(1), 23–34. doi:10.1177/0022487110379216
- Wilder, S. (2017). Parental involvement in mathematics: Giving parents a voice. *International Journal of Primary, Elementary, and Early Years Education, Education 3-13*, 45(1), 104–121. doi:10.1080/03004279.2015.1058407
- Woodward, J. (2004, January/February). Mathematics education in the United States: Past to present. *Journal of Learning Disabilities*, 37(1), 16–31.
- Young, C. Y., Austin, S. M., & Growe, R. (2013, Spring). Defining parental involvement: Perception of school administrators. *Education*, 133(3), 291–297.

## APPENDIX A

### LETTER OF SOLICITATION

Date

Dear Parents,

You are invited to participate in a study. It is about parent involvement in the math programs in the \_\_\_\_\_ . A survey will be filled out by parents. A researcher will collect the data for the study.

#### Seton Hall University Affiliation

The researcher is a doctoral student at Seton Hall University, South Orange, New Jersey in the College of Education & Human Services.

#### Purpose of the Research

This study will show how helpful the school's math programs are for parents. The first program is Everyday Math Online Tools and Games. The next is STAR Math Reports/Home Connect from Renaissance Learning. The third is HomeworkNOW. The fourth is Study Island. The last is Family Math Nights. The study will show if participating increased parents' abilities to help their children with math.

#### Duration of Parent Participation

It should take about 15 minutes to fill out the survey. This is a one-time survey. Parents will not be asked for any other information.

#### Procedures

This survey is for parents of children in grades 1 through 5. Fill it out and seal it in the envelope. Send it back to school in your child's backpack. Teachers will collect the envelopes and send them to the school office.

#### The Parent Survey

The survey asks questions. They are about parent participation in the school's math programs.

#### Voluntary

It is voluntary. It is okay not to complete the survey. You can just throw the survey away if you don't want to complete it or take it at all.

#### Anonymous

No names will be on the surveys. The surveys will not be able to be linked to any person.

#### Confidentiality

Only the researcher and her university mentor will see the survey responses. They will not know which parents wrote the responses. Your child's teacher, by your child returning the envelope, will know that you are participating in the survey. But the teacher will NOT open the sealed envelope. Therefore, the teacher will never know your answers.

#### Contact Information

You can call me if you have any questions.

Kathleen Kalena Seton Hall University Phone

If you have questions about your rights in answering this survey, contact:

Dr. Mary Ruzicka, Director of the Institutional Review Board (IRB) Phone

Consent to participate is indicated by returning the Parent Survey to the school.

Thank you.

Sincerely,

Kathleen Kalena

Doctoral Student

APPENDIX B

PARENT SURVEY

**PARENT SURVEY**

This survey is about your use of the school's math programs. Do **NOT** write your name on this survey. It is anonymous. It is voluntary. One survey per parent. You may have more than one child in the district. Please fill out the survey for the child you had the most difficulty helping with math. Seal the completed survey in the enclosed envelope. Return it to your child's school by TBA. Thank you.

**Please check (X) the box below.**

**1. What school does your child attend?**

School A      School B      School C      School D      School E  
                       

**2. What grade is your child in?**

First Grade      Second Grade      Third Grade      Fourth Grade      Fifth Grade  
                       

**3. Parent Gender**

Male     Female     Other (please specify)

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**4. Parent's Race/Ethnicity**

African American      Asian American      Latino/Hispanic      White Caucasian      Other (please specify)  
                       

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**5. Marital Status**

Married      Divorced      Single      Other (please specify)  
                 

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**6. Relationship to child**

Father      Stepfather      Mother      Stepmother      Guardian      Other (please specify)  
                             

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# #1 EVERYDAY MATH ONLINE TOOLS AND GAMES

Check (X) here if you did **NOT** participate. Skip to the next page.

Please check (X) one box in each row.

**1.1 How helpful was participating in increasing your ability to help your child with math?**

Not at All	Not Very		Very	Extremely
Helpful	Helpful	Helpful	Helpful	Helpful
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**1.2 How often did you participate?**

1-2 Times	1-3 Times	4-6 Times	
a Month	a Week	a Week	Daily
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>Participation in this program:</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
1.3 Improved my understanding of math which helped me help my child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 Gave me skills and resources to help me help my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 Made me more confident in helping my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6 Helped me understand the school's math curriculum and the expectations of my child in math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any comments or suggestions? Would you like to explain any answers above?

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**#2 STAR MATH REPORTS/HOME CONNECT FROM RENAISSANCE  
LEARNING**

Check (X) here if you did **NOT** participate. Skip to the next page.

**Please check (X) one box in each row.**

**2.1 How helpful was participating in increasing your ability to help your child with math?**

Not at All Helpful <input type="checkbox"/>	Not Very Helpful <input type="checkbox"/>	Helpful <input type="checkbox"/>	Very Helpful <input type="checkbox"/>	Extremely Helpful <input type="checkbox"/>
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**2.2 How often did you participate?**

1-2 Times a Month <input type="checkbox"/>	1-3 Times a Week <input type="checkbox"/>	4-6 Times a Week <input type="checkbox"/>	Daily <input type="checkbox"/>
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<b>Participation in this program:</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
2.3 Improved my understanding of math which helped me help my child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Gave me skills and resources to help me help my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Made me more confident in helping my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.6 Helped me understand the school's math curriculum and the expectations of my child in math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any comments or suggestions? Would you like to explain any answers above?

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### #3 HomeworkNOW Program

Check (X) here if you did **NOT** participate. Skip to the next page.

**Please check (X) one box in each row.**

**3.1 How helpful was participating in increasing your ability to help your child with math?**

Not at All Helpful <input type="checkbox"/>	Not Very Helpful <input type="checkbox"/>	Helpful <input type="checkbox"/>	Very Helpful <input type="checkbox"/>	Extremely Helpful <input type="checkbox"/>
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**3.2 How often did you participate?**

1-2 Times a Month <input type="checkbox"/>	1-3 Times a Week <input type="checkbox"/>	4-6 Times a Week <input type="checkbox"/>	Daily <input type="checkbox"/>
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<b>Participation in this program:</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
3.3 Improved my understanding of math which helped me help my child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4 Gave me skills and resources to help me help my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5 Made me more confident in helping my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.6 Helped me understand the school's math curriculum and the expectations of my child in math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any comments or suggestions? Would you like to explain any answers above?

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## #4 STUDY ISLAND

Check (X) here if you did **NOT** participate. Skip to the next page.

Please check (X) one box in each row.

**4.1 How helpful was participating in increasing your ability to help your child with math?**

Not at All Helpful <input type="checkbox"/>	Not Very Helpful <input type="checkbox"/>	Helpful <input type="checkbox"/>	Very Helpful <input type="checkbox"/>	Extremely Helpful <input type="checkbox"/>
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**4.2 How often did you participate?**

1-2 Times a Month <input type="checkbox"/>	1-3 Times a Week <input type="checkbox"/>	4-6 Times a Week <input type="checkbox"/>	Daily <input type="checkbox"/>
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<b>Participation in this program:</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
4.3 Improved my understanding of math which helped me help my child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4 Gave me skills and resources to help me help my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5 Made me more confident in helping my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.6 Helped me understand the school's math curriculum and the expectations of my child in math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any comments or suggestions? Would you like to explain any answers above?

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## #5 FAMILY MATH NIGHTS

Check (X) here if you did **NOT** participate. Go to red note at the bottom of the page.

Please check (X) one box in each row.

**5.1 How helpful was participating in increasing your ability to help your child with math?**

Not at All Helpful <input type="checkbox"/>	Not Very Helpful <input type="checkbox"/>	Helpful <input type="checkbox"/>	Very Helpful <input type="checkbox"/>	Extremely Helpful <input type="checkbox"/>
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**5.2 How often did you participate in the past 6 years?**

1 Time <input type="checkbox"/>	2 Times <input type="checkbox"/>	3 Times <input type="checkbox"/>	4 Times <input type="checkbox"/>	5 Times <input type="checkbox"/>	6 or More Times <input type="checkbox"/>
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<b>Participation in this program:</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
5.3 Improved my understanding of math which helped me help my child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.4 Gave me skills and resources to help me help my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.5 Made me more confident in helping my child with math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.6 Helped me understand the school's math curriculum and the expectations of my child in math.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any comments or suggestions? Would you like to explain any answers above?

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**\*\*Thank you for completing this survey. Please return it in the sealed envelope to your child's school by TBA.**



## APPENDIX C

### LETTER TO SCHOOL DISTRICT SUPERINTENDENT AND BOARD OF EDUCATION

[Date]

[Recipient Name]

Dear [Recipient Name]:

Upon reading the \_\_\_\_ goals of the \_\_\_\_\_, it is apparent that you are dedicated to do whatever it takes to create an optimal learning environment for your students and involve all stakeholders in the school community in the process. Goal number \_\_\_\_ is to \_\_\_\_\_. Goal number \_\_\_\_ is to \_\_\_\_\_. I value the words "continue to" because I understand your district has historically provided many programs to attain these goals. Goal number \_\_\_\_ is \_\_\_\_\_, which shows your commitment to acquire new and viable opportunities for growth of the students, staff, families, and entire school community.

I have learned that your schools offer several exemplary practices such as the HomeworkNOW Program, Everyday Math Online Tools and Games, STAR Math Reports/Home Connect from Renaissance Learning, Family Math Nights, and Study Island to help parents attain necessary skills in being able to help their children with academics particularly in mathematics. These math intervention strategies provide opportunities for parents to increase their abilities in helping their children with math.

#### Seton Hall University Affiliation

As a doctoral student in the Education Leadership, Management, and Policy K-12 Ed.S. to Ed.D. Program at Seton Hall University, College of Education & Human Services, Department of Education Leadership, Management, & Policy, South Orange, New Jersey, I have found that the ever-changing and demanding math curriculum in schools has left many parents unable to help their children with math. As a study for my dissertation in this program, I would like to see if there is a relationship between parent participation in various math intervention strategies and parents' ability to help their children with math.

#### Purpose of the Research

I am writing to request permission from you to study the involvement of your elementary school parents in these math intervention strategies. The purpose of the study is to learn how helpful parent participation in Everyday Math Online Tools and Games, Family Math Nights, HomeworkNOW, STAR Math Reports/Home Connect from Renaissance Learning, and Study Island was in increasing parents' abilities to help their children with math.

#### Proposed Procedures

I would like to survey parents of students in grades one through five in all \_\_\_\_\_ elementary schools to determine how helpful participation in these school-related math intervention strategies were in increasing their abilities to help their children with math.

I would like to send the attached anonymous Parent Involvement Survey, developed with your school practices in mind, to parents of students in first through fifth grades in all \_\_\_\_ elementary schools. Enclosed with the surveys will be an Informed Consent Form explaining the study. This form is also attached for your review.

I will secure and pay for the Parent Involvement Survey and Informed Consent Form to be translated into Spanish by the school district's translator who regularly translates documents for this school district from English into Spanish. This will meet the needs of the Spanish-speaking families in the population.

Participation in this survey will be anonymous and voluntary.

Surveys and Informed Consent Forms (see attached documents) will be sent home in children's backpacks to all parents of children in grades 1 through 5 in all \_\_\_\_ elementary schools. Parents of children in these grades were selected because they would have had some experience in using the district's resources. Pre-K and Kindergarten parents may not have had the opportunity to participate in all programs listed in the survey.

After completing the survey, parents will be asked to seal it in an enclosed envelope. Then send it back to school in their child's backpack. All envelopes will be collected by the secretaries in the school office and given to me. Parents will KEEP the Informed Consent Form for personal records. Only Parent Involvement Surveys will be returned to school. Parents will have 2 weeks to complete the survey.

Halfway through the allotted time for the survey to be returned, I will send a reminder note to parents in students' backpacks.

#### The Parent Involvement Survey Instrument

The Parent Involvement Survey asks parents questions that relate to the impact participation in various school-related math intervention strategies has had on their ability to help their children with math. Sample questions include information on how helpful each strategy was in increasing parents' ability to help their children with math and how often they used skills learned through participation in the strategies.

#### Anonymity

Surveys will be anonymous. Anonymity will be proclaimed in the directions on the survey. No one will be able to link the data to any individual. Parents are asked NOT to write any identifying information on the survey other than what is requested which is name of child's school, child's grade level, and parent's gender, marital status, race/ethnicity, and relationship to child. Because no one will be able to link any surveys and corresponding data to any individual, once a survey is submitted it will NOT be able to be revoked as there will be no way to locate individual responses.

#### Voluntary

Filling out the survey is completely voluntary. Directions on the survey will indicate that it is voluntary. Surveys will be sent to all parents of students in grades 1 through 5 but will not be required to be completed. There is no penalty whatsoever if parents refuse to complete the survey.

### Security and Confidentiality of Data

The survey data will be made available to school leaders, the researcher, and Seton Hall University staff. Survey data will be securely stored on a USB flash drive and kept in a safe, secure environment.

### Duration of Parent Participation

It is anticipated that it should take about 15 minutes for parents to complete the survey. This is a one-time survey. No other input or participation from parents will be requested.

### Participant Protection

In order to protect the participants in the study, I have successfully completed the National Institutes of Health (NIH) web-based training course "Protecting Human Research Participants". Before proceeding in any capacity, I will obtain research clearance from the Seton Hall University Institutional Review Board (IRB).

### Impact of This Study

Results of this study have the potential to inform and guide policy makers and school leaders about the efficient allocation of monetary funding and other resources toward specific types of effective family engagement. Families will benefit from the study. Parents will learn about math intervention strategies they can participate in to enable them to help their children and children will receive the assistance they need to be successful in math. Future researchers will benefit from the outcomes of this research as it will narrow the field of study on specific strategies that are assets to effective student and family scholarship. Understanding the impact of family engagement in specific school-related math intervention strategies on parents' competencies in helping their children with math is noteworthy.

### Contact Information

If you have questions, please contact me, email, Department of Education Leadership, Management & Policy, College of Education and Human Services, Jubilee Hall, Seton Hall University, 400 South Orange Avenue, South Orange, NJ 07079. Phone. You can also contact my dissertation mentor Dr. Michael Kuchar, Student Mentor/Faculty Advisor, Department of Education Leadership, Management & Policy, College of Education and Human Services, Jubilee Hall, Seton Hall University, 400 South Orange Avenue, South Orange, NJ 07079. Phone.

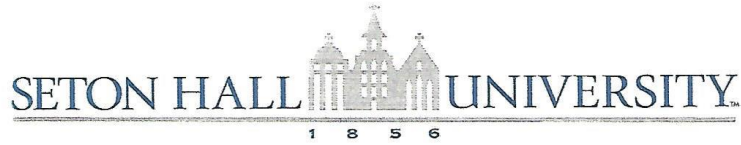
Thank you for your time and consideration of this request. If there is anything I can do to make this study more amenable to you, I would appreciate that information and the opportunity to make necessary amendments.

Sincerely,

[Your Name]

APPENDIX D

IRB APPROVAL LETTER



January 31, 2018

Kathleen Kalena

Dear Ms. Kalena,

The Seton Hall University Institutional Review Board has reviewed your research proposal entitled "The Effect of Family Engagement on Parents' Abilities to Help Children with Math" and has categorized it as exempt.

Enclosed for your records is the signed Request for Approval form.

Please note that, where applicable, subjects must sign and must be given a copy of the Seton Hall University current stamped Letter of Solicitation or Consent Form before the subjects' participation. All data, as well as the investigator's copies of the signed Consent Forms, must be retained by the principal investigator for a period of at least three years following the termination of the project.

Should you wish to make changes to the IRB approved procedures, the following materials must be submitted for IRB review and be approved by the IRB prior to being instituted:

- Description of proposed revisions;
- *If applicable*, any new or revised materials, such as recruitment fliers, letters to subjects, or consent documents; and
- *If applicable*, updated letters of approval from cooperating institutions and IRBs.

At the present time, there is no need for further action on your part with the IRB.

*In harmony with federal regulations, none of the investigators or research staff involved in the study took part in the final decision.*

Sincerely,

A handwritten signature in cursive script that reads "Mary F. Ruzicka, Ph.D.".

Mary F. Ruzicka, Ph.D.  
Professor  
Director, Institutional Review Board

cc: Dr. Michael Kuchar

Office of Institutional Review Board  
Presidents Hall • 400 South Orange Avenue • South Orange, NJ 07079 • Tel: 973.313.6314 • Fax: 973.275.2361 • [www.shu.edu](http://www.shu.edu)

A HOME FOR THE MIND, THE HEART AND THE SPIRIT

**REQUEST FOR APPROVAL OF RESEARCH, DEMONSTRATION OR  
RELATED ACTIVITIES INVOLVING HUMAN SUBJECTS**

All material must be typed.

PROJECT TITLE: The Effect of Family Engagement on Parents' Abilities to Help Their Children with Math

CERTIFICATION STATEMENT:

In making this application, I(we) certify that I(we) have read and understand the University's policies and procedures governing research, development, and related activities involving human subjects. I (we) shall comply with the letter and spirit of those policies. I(we) further acknowledge my(our) obligation to (1) obtain written approval of significant deviations from the originally-approved protocol BEFORE making those deviations, and (2) report immediately all adverse effects of the study on the subjects to the Director of the Institutional Review Board, Seton Hall University, South Orange, NJ 07079.

Kathleen Kalena 11/3/17  
RESEARCHER(S) Kathleen Kalena DATE

\*\*Please print or type out names of all researchers below signature.  
Use separate sheet of paper, if necessary.\*\*

My signature indicates that I have reviewed the attached materials of my student advisee and consider them to meet IRB standards.

Dr. Michael Kuchar 11/3/17  
RESEARCHER'S FACULTY ADVISOR Dr. Michael Kuchar DATE

\*\*Please print or type out name below signature\*\*

The request for approval submitted by the above researcher(s) was considered by the IRB for Research Involving Human Subjects Research at the Jan 2018 meeting.

The application was approved  not approved  by the Committee. Special conditions were  were not  set by the IRB. (Any special conditions are described on the reverse side.)

Mary J. Ruzicka, Ph.D. 1/31/18  
DIRECTOR DATE  
SETON HALL UNIVERSITY INSTITUTIONAL  
REVIEW BOARD FOR HUMAN SUBJECTS RESEARCH

Please review Seton Hall University IRB's Policies and Procedures on website (<http://www.provost.shu.edu/IRB>) for more information. Please note the following requirements:

**Adverse Reactions:** If any untoward incidents or adverse reactions should develop as a result of this study, you are required to immediately notify in writing the Seton Hall University IRB Director, your sponsor and any federal regulatory institutions which may oversee this research, such as the OHRP or the FDA. If the problem is serious, approval may be withdrawn pending further review by the IRB.

**Amendments:** If you wish to change any aspect of this study, please communicate your request in writing (with revised copies of the protocol and/or informed consent where applicable and the Amendment Form) to the IRB Director. The new procedures cannot be initiated until you receive IRB approval.

**Completion of Study:** Please notify Seton Hall University's IRB Director in writing as soon as the research has been completed, along with any results obtained.

**Non-Compliance:** Any issue of non-compliance to regulations will be reported to Seton Hall University's IRB Director, your sponsor and any federal regulatory institutions which may oversee this research, such as the OHRP or the FDA. If the problem is serious, approval may be withdrawn pending further review by the IRB.

**Renewal:** It is the principal investigator's responsibility to maintain IRB approval. A Continuing Review Form will be mailed to you prior to your initial approval anniversary date. **Note:** No research may be conducted (except to prevent immediate hazards to subjects), no data collected, nor any subjects enrolled after the expiration date.