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Parent Involvement Practices of High Achieving Elementary Science Students

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2015

Abstract

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MA, University of Phoenix, 2006

BS, Oakwood University, 2001

Doctoral Study Submitted in Partial Fulfillment

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Abstract

This study addressed a prevalence of low achievement in science courses in an urban school district in Georgia. National leaders and educators have identified the improvement of science proficiency as critical to the future of American industry. The purpose of this study was to examine parent involvement in this school district and its contribution to the academic achievement of successful science students. Social capital theory guided this study by suggesting that students achieve best when investments are made into their academic and social development. A collective case study qualitative research design was used to interview 9 parent participants at 2 elementary schools whose children scored in the exceeds category on the Science CRCT. The research questions focused on what these parents did at home to support their children's academic achievement. Data were collected using a semi-structured interview protocol and analyzed through the categorical aggregation of transcribed interviews. Key findings revealed that the parents invested time and resources in 3 practices: communicating high expectations, supporting and developing key skills, and communicating with teachers. These findings contribute to social change at both the local and community level by creating a starting point for teachers, principals, and district leaders to reexamine the value of parent input in the educational process, and by providing data to support the revision of current parent involvement policies. Possibilities for further study building upon the findings of this study may focus on student perceptions of their parents' parenting as it relates to their science achievement.

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Dedication

This page is dedicated to my mother, Claire Ryce. She is my biggest cheerleader and closest friend. She believed in me, encouraged me, motivated me, pushed me and cheered for me so that I could take this journey. Mom, your capital was well invested and this doctoral study is the continuation of your return.

Acknowledgments

I don't have to rehash my failures because they have become lessons. I will no longer look at my difficulties as such either. I am still alive and better than I was before. For every loss, accomplishment, celebration and failure, I am better and I owe it to God, the ones who love me and who I love the most.

To my dissertation committee, Dr. Fatima Mansur and Dr. Celeste Stanberry, I would like to thank you for your tireless efforts in making me a better researcher. All of the phone calls, emails, comments, suggestions, and words of encouragement will forever be appreciated. Thank you for pushing me and requiring me to push myself to become greater.

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Section 1: Introduction to the Study

Introduction

Many authors and researchers have argued that the academic success of students was influenced by collaborative efforts between the home and school (Epstein, 1995; Hansen & Mackey, 1993; Leithwood, Jantzi, & McElheron-Hopkins, 2006; National Board for Professional Teaching, 2011; Seitsinger, Felner, Brand, & Burns, 2008). Epstein (1995) found that students are more likely to obtain a solid foundation for their education increases if there is a close relationship between their home and their school. This particular conclusion is not new. For instance, the groundwork for this type of thinking in America was laid in 1635 when a group of New England citizens began what is now known as public education in a Boston community (Hansen & Mackey, 1993). These citizens financed the project by using proceeds from a plot of land that they all owned to help fund their school (Hansen & Mackey). This shows that parents even in these times realized that the success of their schools depended on community investment in supporting school development, and not solely on the work of those hired to teach in them.

Two separate reviews of student achievement research have indicated that most of this type of studies have focused on the efforts that schools have made to increase the academic performance of their students (Leithwood, Jantzi, & McElheron-Hopkins, 2006; National Board for Professional Teaching, 2011). Over the years, schools have made many adoptions of and adaptations to curriculum models to try to remain internationally relevant and competitive (Teh, McCullough, Gill, 2010; Tuttle, Teh,

Nichols-Barrer, Gill, Gleason, 2010; Weinbaum, Gregory, Wilkie, Hirsch, Fancsali, 1996). However, there have not been any definitive answers to the question of how to enhance the academic performance of students and decrease the achievement gaps that exist between the academic performance of subgroups of students in the United States (National Board for Professional Teaching, 2011). This lack of definitive answers suggests that consideration needs to be made to more closely identify specific ways that parents can have a positive impact on students in different subject areas. Efforts, attitudes and behaviors of parents and teachers cannot be ignored if the goal is to attain academic success for all students. It is possible for teachers to serve as both providers of instruction and as a bridge for communications between the home and the school (Barnyak & McNelly, 2009). The contributions and involvement of parents are major factors in helping to improve students' level of academic achievement in science, as suggested by Barnyak and McNelly (2009) and Warner (2002).

Although state and federal mandates in the United States require public schools to focus on student achievement for all students, many schools have not consistently maintained the Adequate Yearly Progress (AYP) required by the No Child Left Behind Act of 2002 (Cave & Brown, 2010; Georgia Department of Education, 2010). The lack of AYP in schools in the state of Georgia is a problem that challenges Georgia school systems as they work toward making significant gains in critical academic areas, such as the science, technology, engineering and mathematics (STEM) as well as courses in reading, language arts, and social sciences (Georgia Department of Education, 2010).

Epstein (1995) concluded that parental involvement is a key element in planning for student achievement, identifying six types of parental involvement partnerships:

parenting, communicating, volunteering, learning at home, decision-making, and collaborating with the community. Epstein's work defined and described parental involvement and identified ways for schools to serve and engage parents within the learning community. Parental involvement has been determined to have positive academic and social effects on schools, parents, and students (Hanifan, 1916; Seitsinger, Felner, Brand, & Burns, 2008). Recent studies have shown that the academic achievement of students in schools where there is significant parental involvement was greater than that of students in schools where there is minimal parental involvement (Cave & Brown, 2010; Ingram, Wolfe, & Lieberman, 2007; Sheldon & Epstein, 2005). These findings are in harmony with the fundamentals of social capital theory, connecting parent involvement to achievement.

The types of activities in which parents engage in at their children's schools vary. Several national studies have noted that working parents engage in (1) meeting with their child's teacher on a regular basis, (2) attending school related activities, and (3) helping their children with homework (Kirshbaum, 1998; Pomerantz, Moorman, & Litwack, 2007; Schecter & Sherri, 2009). A common theme in this research suggests that improving parental involvement could in turn improve student achievement. More specific to this study, parental involvement in science-related activities, both at home and at the school, has a positive effect on the perceptions of students, parents and teachers of primary-level students toward science (Hong, Lin, & Lawrenz, 2008; Shymansky, Yore, & Hand, 1999)

Some US schools and districts have responded to research that supports parental involvement as an effective method for improving the academic performance of students

by implementing family science nights in schools (Lundeen, 2005). In these schools and districts, parents are involved in science activities that engage parents and students in interesting scientific phenomena, after which family groups are guided through the process of understanding the core scientific concepts that explain the phenomena (Lundeen, 2005). Lundeen suggested that events like this build the ties between the family and school, which gives opportunities for parents to expand their knowledge base in science. According to Lundeen, this in turn motivates children and parents to learn about science.

There is a positive relationship between parental involvement and the performance of students in science (Chiu and Ho, 2006; Gorard & See, 2009; Lundeen, 2005; Valadez & Moineau, 2010).. If information from parents is used to identify when and under what conditions parental involvement positively influences the achievement of students in science, then schools have the data to better leverage the power of that relationship as they address their students' learning needs. This study affects positive social change by helping to redefine effective practices and to assert the importance of parent support and guidance in the ongoing process of learning. An immediate application of the results from the findings in this study is a better understanding of the involvement practices of parents of students at high performing schools. This in effect enables parents to become more effective in their efforts to make improvements in the academic achievement of their children.

Problem Statement

This study was designed to address a problem of low student achievement among elementary students in science in an urban school district in the state of Georgia. This low

achievement in this district, hereafter referred to as ABC Urban District (pseudonym), was specifically measured using the Georgia Criterion Referenced Competency Test in 2010-2013 (CRCT; Georgia Department of Education, 2010). The CRCT was administered annually to students in Grades 3–8 in the state of Georgia until 2014. It measured basic content skills related to the curriculum. The Georgia Department of Education as well as local school districts, have worked to address the problem by putting taskforces, programs and policies in place (GDOE, 2010). In spite of this, low science achievement continues to be prevalent among students in ABC Urban District.

This problem impacts Georgia's public schools as the recent adoption of the Common Core Curriculum introduced elements across the curriculum that require stronger analytical skills for competency. Skills traditionally developed in isolation in math and science are now spread across core subject courses and require students to be able to question, test a hypothesis, explain, and evaluate their learning. A focus on non-fiction text in reading, writing, problem solving, inquiry and mathematical skill application reflect the priority of stronger scientific skills in the new curriculum. The bigger picture is no longer about making a rating of Adequate Yearly Progress (AYP), but rather producing students with the foundational skills that would help them to be college and career ready. Science core skills are now relevant across the curriculum, making science competency more relevant than ever to public education (Porter, McMaken, Hwang, & Yang, 2011; GDOE, 2014).

Since the implementation of No Child Left Behind in 2001, the state of Georgia has made progress in several areas of student achievement; however, several lingering problems suggest a need to reevaluate how teaching and learning is done (GDOE, 2010).

One notable improvement is the decrease in the number of public schools categorized as "Needs Improvement" status according to guidelines established by No Child Left Behind. Since 2003, the number of schools in "Needs Improvement" status decreased from 533 in 2003 to 22 in 2010 (Georgia Department of Education, 2010). From 2009 to 2010, however, the percentage of schools making Adequate Yearly Progress (AYP) actually decreased at every level. In 2010, 8.6% fewer schools made AYP than in the previous year. Among elementary schools, 7.3% fewer schools made AYP. In the school district in this study, almost half of the elementary schools have only 60% of their fifth graders testing as proficient in science, as measured by the Science Criterion Referenced Competency Test (GDOE, 2010). It is clear that while some schools are meeting standards, many others are not. A look at the data shows that many students are not meeting minimum standards (GDOE, 2010).

There are many possible factors contributing to this problem. Among these factors are: students' attitudes towards the subject area (Marsh, 2004; Murphy, Kerr, Lundy, & McEvoy, 2010; Tapia, 1996), teachers' lack of expertise in science sometimes yielding a lack of enthusiasm or interest in innovative science education (Bulunuz, M. & Jarrett, 2010), teacher difficulty in implementing science professional development skills (Buczynski & Hansen, 2010), and a lack of parental involvement (Cooper & Mosley, 1999; DeBell, 2008, King, 2006, Shumow & Miller, 2001).This study focuses on the parent involvement factor only without consideration for any of the other aforementioned factors exclusively.

While the problem exists for many schools, nonetheless, there are several schools in ABC Urban District whose students test above the district average in science

achievement. At the two schools where this study was held, third- through fifth-grade students have consistently scored well above the district average for each grade from 2010-2013 (2013, GADOE). These scores, representing the most recent data available at the time of the study, support the problem statement and rationale for the selection of the research sites to explore what makes these schools more successful as a whole than the district average in science achievement, as measured by the Georgia Science CRCT. This study was specifically designed to investigate factors behind these higher scores. It was further designed to identify methods of addressing the district's science achievement problem by highlighting what parents of high achieving science students at these schools, hereafter referred to as School A and School B (pseudonyms) are doing at home to help contribute to their students' success.

At the chosen research sites, a number of strategies have been utilized to support the academic program in terms of parent involvement. These strategies, as outlined in the Consolidated School Improvement Plans (2011) of the research sites, are:

- the maintenance of a full time Parent Resource Center where parents may go to receive training and materials to assist them in the academic support of their children,
- the administration of parent surveys to gain perspectives and gather information about the academic program at the school,
- a requirement that all students obtain and use a student agenda as a primary source of communication between the school and home,
- the provision of multiple opportunities for parents to confer with teachers and other support staff, and

- the facilitation of parent workshops, instructional counseling for students, PTA meetings, and other school sponsored events.

These strategies are intended to support the overall academic program at the schools and contributing to the schools' academic successes.

Nature of the Study

The general problem that this research was designed to address is elementary students in the United States' low achievement in the sciences. Since the performance of third-, fourth- and fifth-grade students is a primary concern in the school district, the specific focus of this study was to address this problem by collecting data from parents of fourth- and fifth-grade students at schools whose students were more successful than others in the science areas of the CRCT. Parents of current third-grade students at School A and School B were not included in the sample because 2013 CRCT scores were not available for second-grade students, as they did not take the state assessment the previous year. At the time of the study, the fourth- and fifth-grade students in the study sample had taken the science CRCT the previous spring and therefore had data available for use. . This group of students was best for the investigation of parent involvement practices.

This study used a collective case study qualitative design, in which multiple cases were used in the collection of qualitative data, as suggested by Creswell (2007). A unit of high-achieving science students was examined for the sample from two different sites, and connections were made among the groups in order to generalize and draw conclusions. The goal was to collect data that parents and other stakeholders can use to better support students in science achievement. The reason for selecting the qualitative approach was to offer a one-on-one understanding of individual parent practices. This

model allowed for the social construction of meaning from participants, as suggested by Merriam (2002). Information was also collected from a developmental perspective: that is, one where parents and educators can learn which parent involvement practices are consistent among those most successful in science achievement. The results of the study were expected to identify which educational practices were working and which needed to be updated in light of recent research.

I planned to interview one sample of 6 participants at each research site through one-on-one interviews. I actually interviewed a total of 9 participants after receiving consent forms and scheduling interview sessions. These participants were selected using a clustering procedure and purposeful sampling, as suggested by Creswell (2007). I structured the interview protocol around Joyce Epstein's six types of Parent Involvement and looked for the types of parent involvement practices that were most prevalent among the sample. I then examined the extent to which parents demonstrated each type.

Purpose of the Study

The purpose of this study was to examine how parents contributed to their children's academic success in science. Recent data on science achievement in Georgia and the United States as a whole, shows that the area of science on the elementary (K-5) level is in need of further study and development to help inform policy and practice (National Center for Education Statistics, 2011).By studying how parents make social investments in the lives of their children, I planned to highlight just how much parents were doing to supplement their children's learning. Social capital theory was used to closely examine the investments of stakeholders in the lives of students, as suggested by Bourdieu (1985).I wanted to determine what kinds of trends existed among parents of

successful science students. I was interested in discovering what kinds of practices they put into place to ensure their children learned, and how they supported the environment that allowed their children to exceed the state expectations in the critical and difficult area of science. I was personally invested in this research as both a science teacher and a parent of elementary school-level children. My professional experience as a teacher suggested the power of parent involvement to improve student achievement; this study was designed in part to test this and to identify supporting research. I also hoped to start a new conversation in the field about what kinds of educational practices are really beneficial for children.

Research Questions

The primary research question for this study was: What are parents of elementary school students who have high science achievement doing at home to supplement what is being taught at school? A secondary research question used to guide the inquiry of this study was: To what extent do parents of students with high science achievement assist in supplementing their children's academic achievement?

The results from the individualized interviews were synthesized to determine what commonalities were present among the participants. The research questions were addressed by the consideration of themes that were consistent or inconsistent among the sample.

Conceptual Framework

In the development of a conceptual framework for studying the contribution of key stakeholders to academic achievement, social capital theory provided a foundation on which to build the study (Bassani, 2007; Bolivar & Chrispeels, 2010; Bourdieu, 1985;

Hanifan, 1916). Social capital theory, as defined by Hanifan (1916), is "fellowship, mutual sympathy, and social intercourse among a group of individuals and families who make up a social unit" (p.130). Hanifan suggested that an individual cannot be productive within a community without the involvement of others. In the context of schools, this concept can be applied to the teacher-student relationship or among students within a classroom. Within the greater learning environment, this concept applies to administrators, community partners, and parents. As such, Hanifan and others maintained that the learning process is multidimensional, including and requiring many types of social interactions for learning to take place. Dewey's (1896; 1997) classic investigations provided support for this theory as well. According to Dewey (1997), learning occurs in a social environment and is an active process between the teacher and learner. He argued that an individual's achievements and potential were dependent on the interaction with others. This concept parallels social capital theory in that it supports active parent involvement in the educational process, which is the essence of the study.

Definition of Terms

Some of the key concepts that were used throughout the discussions presented in this study need to be explained. The definitions of these terms are subsequently presented.

Adequate Yearly Progress: A standard established by the No Child Left Behind (NCLB) Act of 2001. Specifically, it is a standard of achievement that represents the meeting or exceeding of guidelines established for the nation under NCLB as well as by individual states (U.S. Department of Education, 2002). Measures of AYP include the attendance of the students in the school, the number of students who take mandated

examinations, the number of students who meet the standards for their grade level on the examination, and the number of students who meet the standards for their grade level on the examination based on socioeconomic status, race/ethnicity, gender, and special needs students.

Community of practice: A group of individuals with shared interests and goals (Pop, Popoviciu & Popoviciu, 2010)

Constructivism: Aspects of the social constructivist theory, a social learning theory that defines knowledge as a system of ideas that build upon past experiences and beliefs (Gordon, 2009).

Intrinsic motivation: The motivation to do a particular thing because of personal interest or connection with the individual rather than the consequence of not doing or doing a particular thing (Skinner, 1978).

Learning community: A group of people who come together at the most basic level for the benefit of educating students. These people include parent volunteers, teachers, administrators and community stakeholders who set goals, plan, train and approach the educational process in ways that embrace ideas and research as a means to solve problems and to make strong long term social investments (Blankstein, 2004).

No Child Left Behind Act: A public law in the United States that was passed in 2002 under President George W. Bush. It governs education at elementary and secondary schools. The stated purpose of the NCLB act was to "close the achievement gap with accountability, flexibility and choice, so that no child is left behind" (US Department of Education, 2002, p. 12).

Parental involvement. Regular and meaningful parent participation in activities involving the academic performance of the students, as well as other school and socially related activities involving their children with their parents or guardians (US Department of Education, 2004).

Social capital: In the context of this study, the camaraderie among individuals within a community that lends itself to resources that contribute toward the benefit of an entire community as well as individual members (Bolivar & Chrispeels, 2010; Hanifan, 1916). As explained by Hanifan, in the same way that financial capital can provide the resources to produce a tangible product, social capital can create the means whereby a product, in this case an educated individual, may be produced Though this definition is 99 years old, it correlates with the analogy of financial capital, and is therefore relevant to the study.

Social cognitive theory: A theory developed by Bandura (2001) that is used to explain processes that yield an understanding and knowledge about people or situations based on observations in social contexts. According to this theory, people learn from observing and processing the data collected from their natural environments.

Assumptions, Limitations, Scope, and Delimitations

Assumptions

There were several assumptions made during the study. It was assumed that research participants would answer study questions as honestly as possible. Considering the setting for the collection of data, it was assumed that participants would feel free to speak candidly about their experiences. Additionally, the assumption was made that the

time allotted for participant interviews would be sufficient and would not negatively affect the quality of responses.

Limitations

This study, although designed to approach the research in an objective and systematic manner, had its limitations. I could not control how truthful or forthcoming participants would be in the data collection process. Participants' personal values and experiences that contributed to the development of their belief systems were also not factors under my control as the researcher. This study also did not take into consideration the type of science instruction students received in class. It did not focus on the specific curriculum, teaching practices or resources available at the school in the discussion of parent contributions to student science achievement.

Scope and Delimitations

The population of this study was limited to parents of fourth and fifth grade science students at two selected schools (schools "A" and "B") in a district (district "X) in Georgia. Student achievement data was used during purposeful sampling to select parents of students with specific science achievement scores of "exceeds" on the most recent science CRCT. The reason for this was so that research participants represented one particular group of students' parents so that the focus was on the unit of high student achievement in science only.

Significance of the Study

This study not only confirmed what classic and recent research says about the success of individuals in relationship to social capital, it presented some parent involvement practices that connected the investment of parents to science achievement.

Study findings offered further insight to the practices of parents who have students who are successful in science by asking the question: "How does your parent involvement support the science curriculum at your child's school?" This study was significant because of its identification of effective practices to support the academic achievement of elementary students in science.

As the challenges in the classroom become greater, in an environment of increased expectations for teachers (sometimes with fewer instructional support personnel), as well as fewer academic resources available, parental involvement will become more vital to student success. Parental involvement will be necessary not only in the schools but also with children in homes as well. Parents will need to communicate and model the values and habits that their children should acquire to be successful in school personally and academically. If parents do not develop a more hands-on approach to the academic careers of their children, then parents and schools may begin to see higher dropout rates and lower test scores (Cook, 2008; Martinez & Klopott, 2005).

Holistic child development is important to this discussion of parent involvement, science achievement and social capital. Children do not only benefit academically from parent involvement, they benefit in their understanding of how to approach the learning process behaviorally. Conversely they also suffer from the absence of parent involvement, missing the lessons taught through consistent, positive parent interaction. Poor student behavior, which can disrupt the learning environment, is a consequence of a lack of parental involvement (Amato & Rivera, 1999). This will have major implications on a local, state, and national level because it will add to the conversation about what is really needed to teach "the total child." Locally, study findings may help parents to focus

their efforts to help their children excel. It may also help educators to develop solutions for students who are missing the benefit of engaged parents by providing a blueprint for mentoring programs and by designing improvement initiatives that more effectively allow parents to be a part of the learning community. This study may also help school systems meet the goals outlined in their school improvement and strategic plans. The study has great implications for the power parents and the members of the greater community have on the personal and academic development of the students. The key toward making better schools may not lie in newer buildings or the existence of the latest technological advancements but really in the hands of key stakeholders in the learning community (Passmore, 2002; Shaver, 2008). This study may contribute to social change by building a case for the community to support the notion that the engagement and involvement of parents can yield a high return on the investment of their time and talents. The synergy created from the collaborative efforts of the teachers and parents could prove to be invaluable for the success of the students.

Summary

There are many factors that contribute to the academic success of students. Research supports parental involvement as a strategy for student achievement as well as the development of a well balanced individual. The theory of social capital confirms the practice of parental involvement as an effective method to support the development of "the total child." Strategies for the improvement of student achievement in science are worthy of further scholarly consideration. Moreover, understanding the practices of parents of successful science students is key to moving forward with both parents and educators to help create the conditions for successful learning communities.

This study looked at what parents were doing at home to supplement the schools' science instruction and to strengthen their children's science skills. Data from the study answered some questions that are currently unanswered regarding the conditions that support student achievement. In the next section, the literature that is related to the focus of this investigation is presented and discussed. Section 3 presents information that describes the specific research design and methodology of the study in detail, which includes a discussion about the sample and population, procedures, data collection and data analysis. Section 4 presents a thorough explanation of the findings from the data collection process. Descriptions of the qualitative analyses (i.e. interviews) are also presented. Section 5 interprets the findings of the study and discusses its contributions to the body of knowledge in the field and implications to social change. It also outlines the recommendations that were formulated as a result of the work conducted in this study for future research.

Section 2: Literature Review

Introduction

This study examined a problem of low science achievement among elementary students in an urban school system in Georgia, hereafter referred to as ABC Urban District (pseudonym). In order to address this problem, a collective case study was conducted. The primary research question for this study was: What are parents of elementary school students who have high science achievement doing at home to supplement what is being taught at school? A secondary research question used to guide the inquiry of this study was: To what extent do parents of students with high science achievement assist in supplementing their children's academic achievement?

The practice of parent involvement in ABC Urban District (pseudonym) is in line with the making of social investments for the benefit of students and the greater community. This literature review includes a discussion of current theories supporting the practice of making social investments as a contributing factor toward student success. It also presents literature on student achievement data and research showing trends in science teaching practices. Research on how local populations create a context for understanding community-related challenges is also examined. Reasons for and against utilizing social investments of stakeholders are discussed in this section as well. The parent-teacher relationship is also explored to identify some of the obstacles to successful community partnerships.

The literature search for this study was conducted using the EBSCOhost, ERIC, Proquest, Education Research Complete, PsycINFO, and Sage databases to identify peer-reviewed primary sources. The key search terms included: Adequate Yearly Progress, community of practice, constructivism, intrinsic motivation, learning community, No Child Left Behind, parental involvement, scientific inquiry, social capital, social cognitive theory, and student achievement. A general outline for this literature review was created to determine the kind of sources needed based on the research questions for this study. The preliminary inquiry began with a general search for studies about learning, parental involvement, and student achievement. The reference lists of these studies were used to identify other relevant studies that focused on social capital theory, parent-teacher relationships, school improvement, and science education.

Social Capital Theory

This study used social capital theory as its theoretical framework. The foundation of the social capital theory lies within the practice of networking in educational settings (Muijs, West, & Ainscow , 2010; Trotman, 2009; Wanat, 2010). This theory is used to explain how the community and stakeholders within a community work together for the common good. Social capital theory was a useful lens for examining the various perspectives on parental involvement within the examined school communities because parental involvement and student achievement are examples of such a relationship. This theoretical framework provided a context for identifying and discussing parent practices that support science achievement among elementary students.

Bourdieu (1985) described social capital as “resources accessible to an individual through a set of connections or a system of valuable relationships where individuals share

beliefs, work, values, or time." This description is being used to refer to social capital throughout the study. This definition is only one in the myriad of perspectives and positions taken on the topic of social capital (Bassani, 2007; Bolivar & Chrispeels, 2010; Eyal, 2008; Hanifan, 1916; Horvat, Weininger, & Lareau, 2003). Social capital also describes networks of relationships that have a positive or negative effect on the lives of individuals. It has its beginnings in the initial relationship between parent and child (Horvat et al., 2003). This foundation provides the framework for all other relationships (Shaffer, 2009). Emotional, informational, and informal opportunities for interaction and exchanges create possibilities for the building of social capital. These networks are then strengthened by the quality and frequency of relational interactions, creating an accumulation of valuable resources (Laser & Leibowitz, 2009). Social capital is rooted in relationships, making connections, shared expectations and faith (Laser & Leibowitz, 2009).

The initial relationship between parent and child lays the groundwork for the building of strong community. This family structure was described by Pop, Popoviciu, and Popoviciu (2010) as a community of practice. According to these researchers, a family's shared understanding and clear communication pathways facilitate better relationships and achieving common goals. Parents and children are connected in this community of practice through shared interests with either parent-centered or parent-initiated activities or child-centered or child- initiated activities. Styles of parenting and types of families are widely diverse; however, personal development happens within the community as people learn from each other (Pop et al., 2010). In this context, the theory

of social capital is a central element of the relationship between parental involvement and student achievement.

Social capital theory was used by Valadez and Moineau (2010) in their study on the impact of family science nights, supporting Lundeen's (2005) earlier findings. Valadez and Moineau specifically examined the impact of family science nights on Latino students, who comprise a large minority group in the United States and make up the largest proportion of high school dropouts in the United States (Valadez & Moineau, 2010). The study showed that the level of parental involvement in Latino families was proportional to other ethnic groups. Valadez and Moineau suggested that parents and students needed science materials and opportunities for enrichment in more linguistically relevant presentations, identifying language barriers as a major factor in the lack of science achievement. These researchers concluded that schools needed to encourage and support better relationships between parents and schools, especially in situations where there are language barriers. They stated that the result of efforts expended in this manner would increase the quality of the educational experiences and conversations, which would serve to enrich science education and achievement of the students (Valadez & Moineau, 2010).

The notion of parental involvement in schools is an important aspect of social capital (Bolivar & Chrispeels, 2010). The contribution of the parent is a valid part of the community. Parent involvement, according to Epstein (1995), is an important factor in family, school, and community partnerships. It is expressed through six subgroups of activities:

1. parenting in the home,

2. communication with the school regarding children's academics,
3. volunteering in programs that benefit children,
4. finding resources for learning at home with kids on homework or school related projects,
5. decision-making activities that allow parents opportunities to help influence policies that affect their children at the school, and
6. collaborating within the community so that programs and resources remain relevant.

A number of factors affect parent involvement: work commitments, ethnicity, family dynamics and challenges, educational level and experience of parents, and teacher expectations (Carlisle, Stanley, & Kemple, 2005). Teachers need to understand all of these dynamics in order to strengthen parent-teacher relationships and thus help students (Carlisle, Stanley, & Kemple, 2005). Social capital takes on a variety of forms for different socioeconomic classes of people. On one hand, the theory of social capital suggests that social networks that exist help students to thrive within their communities (Ream & Palardy, 2008). Conversely, affluent and middle-class networks of parents within schools with diverse groups often steer resources and decisions in favor of their own children, leaving students with the least social capital available to them in inequitable situations (Ream & Palardy, 2008). The implication of this is the possibility for a scarcity of resources due to local political maneuvering and not actually the availability of resources within a school community.

Parent involvement is not always beneficial. A study of two urban elementary school sites over a period of two years, determined that while middle class parent

involvement benefited schools in some ways by bringing needed resources to the school and enriching school culture (Cucchiara & Horvat, 2009). However, this same study noted that middle-class parents' focus of parents was on their own children rather than on the student body as a whole. This form of egocentric parent involvement was found to be unsustainable and not beneficial to overall parent involvement (Cucchiara & Horvat, 2009). In writing on social cognitive theory, Bandura (2002) stated:

> Social efforts to change lives for the better require merging diverse self-interests in support of common core values and goals. Recent years have witnessed growing social fragmentation into separate interest groups, each flexing its own factional efficacy. Pluralism is taking the form of militant factionalism. As a result, people are exercising greater factional influence but achieving less collectively because of mutual immobilization. In addition, mass migration can further contribute to social fragmentation. Societies thus are becoming more diverse and harder to unite around a national vision and purpose (p. 18).

This statement supports the notion that parent involvement can become a tool for the pursuing of resources from an approach that lacks altruism, and is divisive in nature, serving as a vehicle to attain selfishly motivated goals. In order for parent involvement to be beneficial, its focus at the school needs to be more towards the learning community and school culture rather than focused exclusively on the benefit of one or few children (Cucchiara & Horvat, 2009).

The approach that only looks at social capital within the frame of education is an incomplete one. Researchers of social capital have mostly looked into whether it benefits a community (Bassani, 2007). Social capital is present in all systems within a culture.

This also includes religious systems (Ebstyne-King & Furrow, 2008). Through social networks present within denominations, teens experienced a lower occurrence of substance abuse. Participation in religious activities resulted in more positive emotional development among teens, allowing them to develop better coping skills and better decision-making skills as well as to have higher academic achievement (Ebstyne-King & Furrow, 2008). Educators working for reform could benefit from considering some of the non-school based systems that have been able to make effective change through a focused support of children and teens. Having faith-based values and identifying oneself as a person of faith also had positive implications toward the learning process and in student achievement (Jeynes, 2010). This existence of faith guiding behaviors and principles in the lives of learners, coupled with instruction in a religious setting and an effective curricular approach influenced a reduction in the achievement gap. An astounding result from Jeynes' (2010) research shows the complete elimination of the achievement gap in African American students who identified with a faith and whose family units were stable and together. Government policies accounted for the smallest effect on closing the achievement gap.

Perspectives on How Children Learn

There are various theories that educators use to explain how children learn (Pastorino & Doyle-Portillo, 2009). From the constructivism perspective, knowledge is a system of ideas built together or constructed through relationship with an environment (Gordon, 2009). Learning happens through a series of events where past and present experiences come together to create meaning. The learning process is not independent of anything. It happens within the context of changing elements in life. Specifically,

learning is the acquisition of knowledge that is developed through experience, which results in relatively permanent changes in behavior (Pastorino & Doyle-Portillo, 2009). Since children receive many of their early lessons from their parents and these lessons form the foundation for making connections with new information, these early experiences help prepare children to build their knowledge (Bandura, 2002; Piaget, 1952; Skinner, 1953). The connection can be made, then, that a child's experiences with his or her parents play a major role in how and what s/he learns about the world.

The level of social capital present can have an effect on the intrinsic motivation of students. For instance, Skinner (1978) said that intrinsic motivation is a key factor in increasing student achievement. According to Skinner, "A system in which students study primarily to avoid consequences of not studying is neither humane nor very productive. Its by-products include truancy, vandalism and apathy" (p.143). Additionally, Skinner postulated that students should " …study because they want to, because they like to, because they are interested in what they are learning" (p.143). From Skinner's perspective, a successful student is successful because he or she wants to be. In this manner, learning in and of itself is rewarding to the child. If a child is intrinsically motivated, then the assumption could be made that the child will engage in lifelong learning. Parental involvement can help to provide an environment where a child can learn the value of their education as well as the content and skills in a subject. Because the theory of social capital is valid, then a case study that investigates how parents contribute to science achievement will illuminate what gaps are present among elementary students and help educators build upon the knowledge about effective ways to improve the personal and academic success of students.

Perspectives on How Children Learn Science

Several teaching and learning practices have been shown to be beneficial to the way students learn science. When a student-centered approach is used in the science classroom, both students' knowledge as well as their critical thinking skills increase. In a two year study of elementary students through the lens of a constructivist approach, students who were allowed to scaffold their knowledge and draw their own conclusions were able to problem solve and recall concepts better than their peers who were not participating in an investigative approach to science (Jalil, Abu Sbeih, Boujettif, & Barakat, 2009). The cooperative learning strategies of "Think-Pair-Share," "Turn to your Partner," and "Cooperative Note Taking" are some useful ways to increase science mastery in students, especially those with language barriers. Working together in heterogeneous groups helps students to help each other practice, talk about and review science vocabulary that is often very difficult to understand, and to apply science concepts and process skills (Arreguin-Anderson & Esquierdo, 2011). The use of these strategies can also be generalized to include students who have significant deficits in reading comprehension, as these strategies build vocabulary. Cavagnetto, Hand, & Norton-Meier (2010) investigated the use of the Science Writing Heuristic (SWH) approach to science instruction in a a science classroom over the course of several instructional units. Students were given opportunities to write essential questions for the units they studied as well as engage in discussion about their investigations. Students were rarely off task during class during the study. They were engaged mostly in informative discussions when given the opportunity to add to their knowledge base. . These methods of science instruction relate directly to the problem of low science

achievement among elementary students, as the type of instruction contributes to the level of mastery a student obtains in a particular subject. In the consideration of the role of parents, it is important to ask whether parents are supporting students with practices that are complementary to some of the best practices mentioned in this section.

The Local Problem of Low Achievement in Science

The National Center for Education Statistics (2011) reported in its national report card for science achievement that fourth grade students in the state of Georgia scored below the national average in science. Only 34% of Georgia fourth grade students met or exceeded national standards in science with scores of proficient or advanced. The numbers were even lower for students in urban schools, with of only 31% of students scoring at the proficient or advanced levels. The problem of student proficiency in science is also documented by Bursal (2013) who concluded that student proficiency in science decreased as students matriculated through each grade.

There are different reasons why students may not have not been able to maintain proficiency in science. One common finding in the literature is that attitudes towards the subject area could influence the performance of the students and the behaviors of the parents and teachers (Marsh, 2004; Murphy et al., 2010; Tapia, 1996). Bulunuz and Jarrett (2010) found that the lack of non-school related background experiences in science sometimes yield a lack of enthusiasm with teachers or lack of interest in the development of innovative science lessons. Many elementary science educators also reported that they have difficulty implementing science professional development skills learned due to classroom barriers and school limitations (Buczynski & Hansen, 2010). As stated previously, a social factor, namely, a lack of parental involvement in the school has

also been shown to influence the academic achievement of students. Numerous reasons for parents' lack of involvement in the education of their child/ren have been reported. They include: (1) increase in single parent families (DeBell, 2008), (2) economic challenges of the economy that keep parents away from the home and at work for longer hours or that render parents unemployed (Cooper & Mosley, 1999), (3) lack of education on the part of the parents (Shumow & Miller, 2001), and (4) lack of school-initiated contact with parents (King, 2006). Parental involvement is one element that has not been fully explored in research and in the classroom. This is a critical factor in the examination of what makes students successful, yet it has not received consideration for also being a part of the solution.

Contributions to the Problem of Low Achievement in Science

To address the problem of low science achievement scores among students in an urban district in Georgia, a number of factors are examined for their contributions to the problem, as well as their problem-solving potential. In the state of Georgia, one consideration is the demographic make-up of the district. Another consideration is the climate of achievement that exists.

The ethnic makeup of students in the district being studied is not evidence for a direct explanation of the problem; however, the data does serve as background information on the community in which the problems exists. In this community under study, African American students account for half of the general population. A combination of other ethnic groups accounts for the other half of the population (United States Census Bureau, 2010). Since African American students are such a large percentage of the community, research pertaining to this group is relevant to this study.

The achievement gap has widened in recent years among African American teens (USDOE, 2010). Several reasons are cited for this phenomenon, including: (1) poor instruction, (2) African American students in predominantly African American schools are being taught by teachers who are not highly qualified to teach their particular subject area, (3) a lack of funding for schools in African American districts, and (4) a rise in poverty and other social conditions that deteriorate the African American community and have a negative impact on learning (Johnson & Kritsonis, 2010). Ineffective teaching strategies, such as ability grouping, have also been found to only benefit those students who are already proficient in the subject areas taught. This leavesstudents who are struggling in classes that do not challenge them and that do not help improve their academic skills (Lleras & Rangel, 2009).

African American students have also been found to struggle with reading (Guthrie, Coddington, & Wigfield, 2009). Avoidance and lack of intrinsic motivation were two major factors that contributed to poor reading achievement in African American students, with avoidance being a factor contributing to low reading fluency (Guthrie, Coddington, & Wigfield, 2009). Available resources need to be leveraged by schools so that African American students can meet and exceed expectations, both in the classroom on a daily basis and on standardized tests. Teaching practices that are effective as well as relevant to the student population are central to the success of communities of practice that seek to improve the academic experiences and achievement of African American students (Shaffer, 2009).

Stakeholder contributions are another major part of developing a solution to the problem of low achievement in science. Parent involvement, parent-teacher relationships,

teacher skill levels, and science best practices all play a part in student achievement (USDOE, 2010). It is for this reason that a case study focusing on parent involvement and science achievement is necessary at this time. Considering what social capital theory postulates, looking specifically on how parents contribute to their children's science achievement will generate a wealth of information for educators and parents to use at the local level and beyond to improve student achievement.

Current Issues and Practices in Science Education

Significant differences exist among what parents, teachers, and students believe are the skills necessary to be proficient in science and mathematics (Marsh, 2004). Problem solving, critical thinking, and conducting research are some of the skills that contribute to fluency and achievement in math and science (Hotaman, 2008). Among stakeholders, beliefs may vary based on cultural differences. An example of this is found in a study conducted in Turkey, where the constructivist learning approach was difficult to implement successfully. The main problem of primary level learners in Turkey was their belief that the content being taught and learned was not relevant to the real world. In turn, the researchers concluded that the practice of constructing beliefs about the content was not genuine, having no real world impact on the students (Acat, Anagun & Anilan, 2010).

One reason for the belief that new information was irrelevant could be misconceptions that existed. Misconceptions come from a lack of background experiences that allow students to make connections between previously learned concepts and new information. Understanding the misconceptions students have about science can help teachers to design meaningful instruction that corrects those misconceptions and

helps students to better process what they have learned (Gomez-Zwiep, 2008). They can also help parents and other stakeholders better support the science curriculum.

Many current practices in science education fall short of the inquiry-based goal set by state science standards (Glen & Dotger, 2009; Owens, 2009). The No Child Left Behind Act of 2002, with its focus on high stakes state testing changed how teachers teach (Glen & Dotger, 2009). Owens found that many teachers are "teaching to the test" and not spending the necessary amount of time on content so that they can cover all of the material being assessed on the state assessment.

Sub par science vocabulary instruction practices also contributes to lack of mastery in science . Many elementary teachers' science vocabulary instruction is focused on identification and labeling of key concepts. Glen and Dotger (2009) found that when students were not given sufficient opportunities to develop understandings of science vocabulary through inquiry based approaches, such as experiments, students had difficulty generalizing scientific concepts and communicating how vocabulary related to them. Students were, however, able to build connections to science vocabulary through non-scientific avenues during communication with their teacher (Glen & Dotger, 2009).

Inquiry based learning is not a practice that has only shown its effectiveness in the general education or accelerated courses. It is a best practice that works across ability levels .A recent study measuring science achievement and students with disabilities showed positive results with inquiry based learning. For students with disabilities, inquiry based instructionwas particularly effective for both teaching content and for the retention of what was learned. In the study, using a hands-on, inquiry-based approach for instruction during a series of lessons about electrical circuits yielded retention over time

and improved student attitudes toward science (Aydeniz, Cihak, Graham, & Retinger, 2012).

Lambert and Ariza (2008) argue that in communities with diverse student populations, inquiry-based learning allows students to make connections from past knowledge to new information and to apply the information learned in ways that are relevant and meaningful to them. During an activity with students from island countries, students were given the task of developing an imaginary island based on their knowledge of climate and geographical challenges. This assignment challenged their understanding of an ecosystem and climate. Students would have to create their imaginary island with a consideration for factors that affect the ecosystem. This approach strengthened students' study skills, giving them the opportunity to better follow the instructional content. Overall, inquiry-based experiences yielded students who felt better prepared to take state standardized exams. Students studied were even more favorable toward looking at futures in scientific fields due to their experiences (Li et al., 2006).

Students were more receptive to science instruction when it was based on learning through active practice rather than lectures from the teacher (Olgun & Adali, 2008). They were able to understand difficult concepts when they could connect vocabulary with process skills within a case study. In addition to this, the inquiry-based approach allowed students to reinforce their learning through peer dialogue throughout the learning process (Olgun & Adali, 2008). The modeling of active listening strategies by teachers during science instruction allowed students to learn what kind of discourse to have during scientific inquiry. The act of questioning and active listening allowed students to understand the multidimensional nature of science. This understanding led to a greater

critical insight into scientific knowledge (Bennet, Hand, Mendez & Yoon, 2010). Student questioning enhanced the teaching and learning process. It engaged students in the learning process and allowed teachers to evaluate higher-order thinking and comprehension of scientific concepts. This strategy also helps students to be self reflective about their own learning (Chin & Osborne, 2008).

Science pedagogy is not the only classroom factor connected to favorable attitudes from students about science. Having science kits in classrooms made students more interested in learning science (Houston, Fraser & Ledbetter, 2008). When compared to the control group who used a textbook instructional model with no hands-on approaches to instruction, students' motivation toward science instruction was more significant. This is evidenced in the observed student behavior in both the control and experimental groups. Students whose classrooms had science kits used during instruction had better classroom behavior than their peers in the control group with only the textbook use (Houston et al., 2008). In addition to classroom kits, participation in other science focused programs benefited students' science learning. For students who participated in extracurricular activities related to Science, Technology, Engineering and Math, there was a significant academic benefit in science achievement over their peers who do not attend such programs (Gottfried & Williams, 2013).

Students responded positively to more exposure to science materials at school and also to opportunities for science use at home (Shymansky, Yore, & Hand, 1999). The purpose of the Science PALs project was to foster strong connections between the home and school in the area of science. The program created opportunities for parents to become actively engaged in exposing their children to science concepts in the primary

grades. Components included a rich literacy connection that served as the key anticipatory element to generate interest in the science activity. Parents were also given simple directions, activity selections, and materials to complete inquiry-based projects at home. Parents were encouraged to be active participants in the learning process through classroom updates and through ongoing opportunities to volunteer during science instruction (Shymansky et al., 1999).

Considering recent studies, one possible solution to the student achievement challenges in science would then be to improve the time and quality of the content being presented in science classrooms. There are other significant factors affecting time and quality of science instruction. The kind of instruction needed for mastery in urban schools with students from low socioeconomic status backgrounds requires a much more planned approach rooted in research about this particular population rather than research done with affluent populations. The gap that exists is demonstrated by the difference between some students achieving proficiency in a matter of days and others taking weeks to learn science concepts (Glen & Dotger, 2009; Owens, 2009). This realization illuminates the problem of poor science achievement. If teaching for mastery is to occur, then the entire science curriculum suffers because teachers are unable to teach all of the concepts (Li, Klahr, & Siler, 2006). A lack of time and resources translates to less effective science instruction that allows the achievement gap to remain and widen (Li, Klahr & Siler, 2006).

Another factor affecting achievement in urban schools is teacher turnover. In urban schools there is a significantly higher percentage of novice teacher turnover in the subject of science. One reason is the lack of significant teacher support in schools with

limited funding and a focus on standardized testing. Additionally, many teachers do not understand the cultures of the students they teach, so that disconnect makes teaching the complex concepts of science a challenge. For other teachers, the challenges dealing with student motivation and behavior take precedence to creative teaching, making their focus managing the learning environment rather than teaching (Duncan, 2014)

There are some basic generalizations that can be garnered from the research reviewed. For instance, in order to have effective instruction in science, teachers need to be equipped with the tools to provide such instruction. When they do not have the tools, their instructional practices suffer from their lack of confidence. A lack of confidence in science knowledge and science teaching strategies in teachers contribute to ineffective science instruction. When teachers are given adequate experiences and opportunities to learn science material and to learn how to teach science material, their confidence increases, in turn increasing their effectiveness (Kazempour, 2014) Ongoing and meaningful teacher professional development in science education yielded positive outcomes on two measureable factors. Teachers felt better prepared to teach course content because they were more familiar with teaching resources and had the opportunity to talk and share ideas. Professional development also had a positive effect on science scores on the standardized assessment, showing significant gains between pretests and posttests (Lee, et.al., 2008)

In step with the idea of teacher confidence is teacher expectations. Teachers often are limited by what they expect their students to be able to produce or know. In some cases, teachers limit themselves during the planning process in science. In a recent study, teachers were tasked with the challenge of designing a lesson for a hypothetically ideal

situation. Without the general limitations such as class size, ability levels of students, limited resources, language barriers and so on, teachers still did not access the most current resources available when planning. Teachers relied mostly on PowerPoint, traditional blackboard and science textbooks when planning lessons. This finding can be generalized to conclude that many teachers are not utilizing more interactive technology to support the science curriculum even if they have access to them. Some examples of these technologies are smart boards, the Internet or science software (Savasci Açikalin, 2014).

The instructional needs of students are met when teachers possess the tools, confidence and opportunity to do their jobs well. This type of foundation for the students from the teachers could serve to perpetuate lifelong learning skills if collaborative efforts are established with the parents in the students' homes and schools. Support for this idea is provided in the next section.

Social Investments in the Community of Practice

Educational reform has been an issue within the United States and internationally for over half a century (Gorey, 2009; Kerdeman, 2009; Spencer, 2009). Educational reform has brought about improvements in some places, and has been seemingly ineffective in others. The push for reform at the local, district, state and even federal levels is causing more of a consideration for the context each school exists in and the changes that will facilitate results at the classroom level (Fullan, 2009). Part of educational reform is making sure that teachers, administrators, and other support staff in schools have the training and resources available to them so that they are able to successfully make social investments into their schools and communities. Several studies

have documented the benefits of quality professional development and its relationship to student achievement (Cave & Brown, 2010; Kennedy, 2010; Schwarz, 2009). Cultivating communities of practice in schools is a practice that benefits the entire community. At the most basic level, it provides support for teachers in best practices for students. It creates a network not only for instructional support, but also for professional support, as more experienced and newer teachers interact with each other, which in turn strengthens the teaching skills of all teachers. Communities of practice are necessary for fostering the growth of all students. (Hoyte, Myers, Powell, Sansone, & Walter, 2010).

Instructional improvements can occur at the local school with a focused effort from school leaders (Winterman, 2008). Winterman's goal was to change the school culture. This was done by creating a leadership team of various educational professionals within the school. Over the course of several years, they set out to transition themselves into a data-driven school. They analyzed teaching practices to determine what worked and what did not. Results from Winterman's research showed that as a result of their efforts, significant improvements in student achievement were made. In the case study of a novice teacher, Hyland (2009) found that support through professional development, and experienced teacher educators and mentors in a program that focused on high expectations for teachers and students yielded academic gains for students .This is yet another example of the benefits of strong learning communities. As in Winterman's research, the entire investment of the community yielded positive gains in student achievement.

Parent Involvement

Defining what schools and educators refer to as "parent involvement" is critical to the conversation. The definition seems to change based on the context and who is making the point, however C.J. Russo et al (2012), suggests that the issue of parent involvement is a complicated one. Some points to consider, are that while many educators agree that parent involvement in their children's education has positive effects, the practical side of how that looks in terms of programs and actual volunteerism is not clear. In many instances, increased parent presence in the school takes away from the administrators' ability to attend to supervising instructional practices and managing the school. It is also a question of to what extent is involvement helpful considering the diverse student populations, diverse student needs, and challenges of student instruction and safety.

To properly address parent involvement in the context for this review is to consider it in terms of how parents, in relationship with their children, the school and the community, effect change. Smith et al. (2011) discovered a number of charter schools that made it a priority to address parent involvement differently. Instead of only asking for parent involvement in various areas of the school culture, they met the needs of parents in a number of ways, from adjusting times of meetings, to providing resources to help parents with their job readiness, to providing support so that parents could help their children with homework. This study showed how parent involvement can be possible in socio economically, linguistically and culturally diverse schools when schools create plans to meet parents where they are.

One way this is demonstrated is in communities of practice. Part of what makes communities of practice successful is the parent-teacher relationship (Risko & Walker-

Dalhouse, 2009). Success in the teacher-parent relationship comes from proactive and intentional efforts on the part of teachers to invite and engage parentsTeachers do not need to make demands of parents, but rather to understand parents and students' positions and to build a partnership with them that empowers them. This can be done by being positive, offering resources, and visiting homes. In homes of immigrants, African Americans or Latinos, or where there may be low socio-economic status, teachers need to work harder to make parents feel a part of the school community (Risko, & Walker-Dalhouse, 2009). For parents in at-risk schools, educators need to set realistic standards for parent involvement. They need to understand the needs of parents and their community and determine whether the school can help to meet some of those needs by identifying and directing parents to resources or by actually providing those services as a part of the parent involvement plan. When parents are met at their level of need, they tend to feel less threatened, and learn to associate with the school positively. As a result, positive connections are made and the school community benefits from parent involvement (Vandergrift & Greene, 1992).

One way to increase parent contacts and teacher contacts is to utilize email and other forms of electronic contact for the transmission of information between teachers and parents (Thompson, 2008). This type of contact can have productive or counterproductive outcomes, depending on both parents and teachers. In a study that focused on parental involvement in the form of email communication from an interpretive approach, analysis of study findings determined that email communication was not regular between the teacher and most parents. Only a few parents regularly had email contact with teachers. In addition, this kind of interaction was beneficial for

informational purposes, but did not build relationships between parents and teachers (Thompson, 2008). Answers to the question of how meaningful relationships are built in diverse communities, and whether their existence means academic success for students, still need to be identified.

A belief exists that a shift from a school-focused approach to a family-focused approach needs to occur in order to increase the success of students and the learning community as a whole (Knopf & Swick, 2008). However, putting families at the center of the discussion is not enough to motivate students or others in the learning community to make academic improvements (Eyal, 2008). The issue of making social investments into communities is not new. Parents have shown the power of their might and entrepreneurial efforts in starting schools and by spearheading educational initiatives and activities (Eyal, 2008). A researcher focusing on parent efforts in a school showed how parents were trained on how a local school system worked, and specifically how to access resources and how to contact individuals (Bolivar & Chrispeels 2010). From this point, parents were able to begin to build networks among themselves and the school system. The research, based on social capital theory, took the position that parent involvement and empowerment is both necessary and beneficial to school culture (Bolivar & Chrispeels 2010). In another study, parent support at the home level in the form of family interactions was determined to be as effective as parent support in the form of meetings at the school (Houtenville & Conway, 2008). Parent involvement affects student achievement in a positive way regardless of family backgrounds. Experts believe there needs to be a balance between the work of the school and that of the home. The over-availability of resources from the school can sometimes contribute to the lack of parent

involvement for some. According to Houtenville & Conway (2008), many parents do not utilize school resources that are made available to them.

Based on the consideration that the nature, challenges and expectations of the family have changed, experts in the field have made suggestions to strengthen the family involvement and to place families at the center of the education conversation (Anderson, 2000). The challenge, however, is at the crossroads between expert recommendations and actual planning, implementation, and management of family involvement programs (Anderson, 2000). Despite structured approaches, a problem still exists in what parents are actually willing to do in terms of academic support. During a study of parent involvement a group of parents were given clear expectations and guidelines for reading activities at home with their children. Many did not complete the activities asked, with the most parent involvement found with one activity where parents did not have to contribute any outside resources of their own because the school provided materials for that particular activity. These activities did not require any specialized pre-existing skills or academic expertise in order to serve as support to the students, and yet, researchers found that parents in general reduced their level of participation significantly as the requests for involvement became greater (Anderson, 2000).

For some involved parents, the creation and support of an environment that expects excellence by infusing literacy into every aspect of life is another way to ensure that children are well educated. By capitalizing on environmental print, opportunities for practicing reading, such as religious gatherings and recreational reading, become normalized for children. Creating norms at home that utilize the skills necessary to be successful at school allows parents to be involved in the academic development of their

children (Johnson, 2010). In a study that looked at parents' views toward student achievement, gaps were found in relationship to parent goals for their children, strategies employed to attain those goals and actual academic achievement (Garas-York, 2010).

Effective educators can become a part of the solution to fill in the missing pieces for students. This is not just by knowing students, but by making strategic efforts to know parents as well and to understand where the breakdown happens and why this break down occurs (O'Connor, 2008). In addition to their roles, educators must take notice when data becomes available that reveals gaps in parent confidence in the school (O'Connor, 2008). This is especially pertinent for parents of students with special needs. Parents of students have developed various attitudes and views about schools when their children have been identified as being in need of special services. Teachers need to be proactive toward understanding every child in their classrooms so that they can be able to work collaboratively with parents for the benefit of students (Weasmer & Woods, 2010).

A study conducted in Ireland about the relationships between parents of students with special education needs and the teachers and schools that service them found that parents did not feel as though they were equal partners in the educational process (O'Connor, 2008). Parents had to push to both understand the school and its policies and to be understood and taken seriously by the schools (O'Connor, 2008). This study suggested that parents who are involved in the school community have a better understanding of the organization of the school and the program that is providing services to their child. This study showed that this level of activism is not easy on the parents because they have to push to become a part of a community where their children are natural parts, but they may be looked upon as outsiders (O'Connor, 2008).

Another perspective about parents' relationships to schools considered immigrant parents and parental involvement. The beliefs and perspectives of immigrant Chinese parents were examined to determine their motives and reasoning that shape their interactions with teachers and their own children's education (Wang, 2008). It was found that the level of parent involvement with teachers was largely based on how parents viewed the educational system in the United States. Cultural views of the lack of rigor of American schools, as well as other barriers such as language, work, and time, affected the kind of involvement parents displayed. Parents' involvement at home was structured after the Chinese educational model of high expectations. Involvement at school ranged from attending school functions to volunteering, to sitting in the class with their children (Wang, 2008).

The research further supports positive social change occurring when parents are actively involved in their children's education (Orthner et al., 2009). In Orthner et al's study of 3,316 children between the ages of 12-14 with married parents, parent involvement at school did not have a significant effect on high school graduation, but it did affect whether students went on to pursue a post-secondary education. Where parent involvement did have an effect was in the religious activities in which the family engaged. These teens were 24% more likely to graduate from school than their non-religious counterparts. Children in two parent homes with married parents also fared better than their peers in divorced homes. This suggests that the kinds of social bonds made within a religious context have a great effect on children in an intrinsic way so that they are exhibiting positive outcomes in social and academic contexts (Orthner, et. al, 2009).

Forming valid relationships with parents that include taking time to get to know them and how they feel about their child is essential to building the teacher- parent relationship (Knopf & Swick, 2007; Pena, 2000; Pryor, 1995). While teachers have communicated that parent involvement is necessary to improve the learning process, parents have shared their experiences of the difficulty of the parent-teacher relationship (Pryor, 1995). Parents often communicate the need to feel as though they are well received in the school environment (Pena, 2000). It is the parent-teacher relationship that strongly influences parent perceptions about their child's teacher and school. Teachers need to be initiators of positive contact with parents. Teachers do not need to be guided by their own opinions of parents as a whole, but, through the engagement of parents, need to allow for understanding to grow (Knopf & Swick, 2007). Educators have an equal stake in the success of their students and the relationships that are nurtured between the educators and parents. One study that looked at several factors that influence student achievement from the contribution of the principal found that more education, gender, years worked as a principal, and years worked as an educator, affect student achievement (Gieselmann, 2009).

A quantitative study showed variations between principal and teacher perspectives about parent involvement as well as how these beliefs translated into actual practice at the school level (Barnyak & McNelly, 2009). Teachers are optimistic about student achievement when there is a history of high achievement and support from parents (Beard, Hoy & Hoy, 2010). Principal and teacher attitudes in favor of parent involvement have shown evidence of increased math achievement (Gordon & Louis, 2009). In an urban school population in a study involving teachers who live or have lived

in the school community for an extended time period, teachers with ties to urban communities have a unique juxtaposition to their professional roles. Often, the resources these teachers may have are left untapped. Reed (2009) suggested that teachers be utilized as community-school liaisons in order to maximize the social capital. The connection between teachers and student achievement is a necessary one. This was also supported in another study that recognized the value of training teachers to be able to meet the needs of the students in the classroom setting. Professional development is used as a tool to mold better school leaders in order to create a richer learning environment and a better learning community (Yost, Vogel, & Rosenberg, 2009). In order for elementary students to be successful in science, a strong learning community that includes active educators and parents is essential.

The positive impact of parent involvement does not have to be realized within the school walls, in school programs or activities. According to Quandria (2012), parent involvement in Head Start programs within the school do not show significant contribution to their children's academic achievement. Poza's research (2014) supports this idea by suggesting that it is not so much the parent involvement at the school house that makes a difference, but rather those behaviors that parents who are likely to volunteer within the learning community exhibit consistently with their children. These behaviors help to support a culture of academic learning as well as positive character traits.

Methodological Investigations in Context

A group of pre-service teachers participated in a mixed-methods study that involved pretests, posttests, and semi structured interviews (Cone, 2009). Data collection

and analysis found that providing opportunities for more diversity training among pre-service teachers allowed them to approach science content in a positive manner. Gaining understanding about their students' communities also dispelled preexisting ideas about students and allowed participants to feel better prepared to teach science effectively (Cone, 2009).

Research focusing on the professional knowledge educators have in science has been conducted on the graduate level, as well as in colleges and elementary schools. Bulunuz and Jarrett (2010) surveyed 29 graduate level educators on their conceptual understanding of four core scientific concepts. In this mixed-methods study, data from pre and post instrument surveys as well as qualitative journals showed that with active training, teachers' understandings of scientific concepts were changed. Another study of parental involvement with a group of 415 elementary students between grades three and five was conducted by Lee and Bowen (2006). Findings were in line with social capital theory, showing the benefit of students with the investment of parents. The grade level and qualitative component are similar to this study (Lee & Bowen, 2006).

The research approach used in a study of parent perceptions of parental involvement by Hornby and White (2010) is also consistent with the methodology in this study. Gaps were found in perceptions of parent involvement at several schools based on an analysis of interviews with principals as well as survey responses. Results revealed several reasons for those gaps, including teacher training and a lack of support provided for parents by the school (Hornby & Witte, 2010). Epstein's parental involvement framework was used as an anchor for a study conducted by Wanat (2010). Parents were interviewed on how they believe the school encouraged or discouraged parental

involvement. During these interviews, many themes emerged, two of which are notable: (1) parents who were content with their children's schools participated more at the school; and (2) parents who were not pleased with their children's school focused more on activities with their children within their family unit that they considered parent involvement (Wanat, 2010). These investigations relate to the problem of low science achievement through the lens of parent contributions to success.

Summary

The conversation on science education in the United States is ongoing. Understanding the context for the problem being studied is important when developing a plan for improvement. How parents and teachers see themselves and each other and their relationships to learning communities is paramount when looking for correlations that may exist between social investments and student achievement. The research reviewed above strongly suggests positive outcomes when effective teaching practices are utilized to teach science. Along with this, teachers need to be effectively trained in best practices in science education. The contribution of parents is also a valid factor in the academic and social development of children. Social capital theory was used to provide the rationale for work developed in this study. Section 3 is used to present and discuss the specific methodology that was used to implement the plans for the research study.

Section 3: Research Methods

Introduction

This study investigated a problem of low science achievement levels by elementary students in the state of Georgia (Georgia Department of Education, 2010). This problem impacts Georgia's public schools because many of them are not meeting the standards outlined by the No Child Left Behind Act with the focus of working toward 100 percent student proficiency. Performance below the standards impacts schools and teachers directly with consequences ranging from verbal reprimands to loss of specific testing related financial incentives. This problem has great implications for educators, parents, and other community stakeholders.

The purpose of this study was to examine parent involvement and its role in science achievement. The primary research question for this study was: What are parents of elementary school students who have high science achievement doing at home to supplement what is being taught at school? A secondary research question used to guide the inquiry of this study was: To what extent do parents of students with high science achievement assist in supplementing their children's academic achievement?

The results from the interviews were synthesized to determine what commonalities were present among the participants. The research questions were addressed through identifying themes that recurred during the investigation.

Research Design and Approach

This study used a qualitative, collective case study research design (Creswell, 2009). According to Merriam (2002), qualitative research "…lies with the idea that meaning is socially constructed by individuals in interaction with their world" (p. 3). This

means that individuals need to build meaning and understanding based on how they experience the world. This study was designed for the discovery of behaviors, practices, trends and meaning to answer the research questions. The kind of data that was collected was best analyzed using a qualitative approach because participants were asked to share beliefs and experiences. They were also asked to answer several open-ended questions. According to Rubin and Rubin (2005), a researcher must think about the purpose for research and the conclusions by which they would use that research. The types of conclusions desired made it necessary to ask the participants open-ended questions so that responses were authentic, original and unrestricted. Conversely, only collecting data using a static scale limits the kind of responses to those already predetermined by the designer of the research protocol. Qualitative research offers a context to properly collect, analyze and present information to meet the goals of the study.

Within the qualitative research approach, there are several choices for the qualitative researcher. Creswell (2007) lists five approaches to qualitative inquiry: Narrative, phenomenology, grounded theory, ethnography and case study. The case study was selected for this study. The case study focuses on a particular subject or matter within a specific context. By focusing on several cases of parents of successful science students, a close examination was conducted in order to make connections between parent involvement and science achievement. The "unit of analysis" (Merriam, 2002, p.8) in this particular study was student success in science among a group of parents. The case study approach provided for a focused investigation in order to answer the research questions. In addition, I believed that the theoretical framework of social capital theory

could be best applied within a qualitative context where one-on-one interviews allowed for in depth inquiry into the impact of parent involvement and science achievement.

Setting and Sample

The setting for this research was two elementary schools located in an urban school district in Georgia. Selection of the schools was made through purposive sampling, as suggested by Yin (2011); these schools were intentionally chosen because of their size and science tests cores to help ensure that a representative sample of parents could be obtained, based on the Science CRCT data.

School A (pseudonym) is an urban school with approximately 1,000 students enrolled in Pre-Kindergarten through 5th grade at the time of the study. This school required at least 16 hours of parental involvement during each school year. At the time of the study, the majority of the students were African American (99%), with Latino students representing .039% of the student body, Caucasian students representing .020%, and multiracial students representing .029%. Students' ages ranged from 4 years old to 12 years old.

School B (pseudonym) is an urban school with approximately 1000 students enrolled in grades Pre-Kindergarten through 5th grade at the time of the study. This school also required at least 16 hours of parental involvement during the school year. At the time of the study, the majority of students were African American (98%) with Latino students representing 0.74% of the student body, Caucasian students representing 0.53%, and multiracial students representing 0.11%. Students' ages ranged from 4 years' old to 12 years' old.

Both schools are located in mixed-use neighborhoods with single family homes, apartments, businesses, public services such as libraries and fire stations, etc.).The county data on schools with students not meeting expectations in science shows that in relationship to the district, School A and School B have starkly contrasting student scores for science achievement, while retaining some of the same demographic data as the district in which they are located (Georgia Department of Education, 2010). The only distinct difference between the study sites and other district schools is the requirement of parent involvement for at least 16 hours per year. This distinction created an ideal context for each research site, with parent involvement being a pillar of the schools' culture and social capital theory framing the study.

Participants in the data sample were very important to the integrity of the study. Parents of fourth- and fifth-grade students performing at a level of "exceeding the standard" of the most recent science CRCT, taken at either School A or School B the previous year, were invited to participate in the study. These participants were purposefully selected to provide the best possible collection of perspectives and experiences on the problem, as recommended by Creswell (2007). The original design of the study called for a total of six parents from each site to participate in individual interviews. A total of 9 parents from schools A and B actually participated in the final study.

Access to participants was gained first through the school district, then the principals of each school. Principals were asked to send study materials that I provided to parents of students in Grade 4 and Grade 6 whose children scored in the "exceeds" category of the most recent science CRCT. A letter of invitation, consent form, and self-

addressed stamped envelope were included in the materials sent to parents. Parents were initially invited to volunteer in the study through invitations sent in students' weekly couriers , a weekly school to home communication tool. Parents who responded and who qualified to participate in the study were then given a consent form and more information about the study.

Justification for the Number of Participants

The sample size for the study was not justified based on the formula for standard error in a research study, as suggested by Gravetter and Wallnau (2008) because this study was qualitative as opposed to quantitative. In a quantitative study, the margin of error would have to be established and considered when determining participants in order to produce valid and reliable results. In this qualitative study, the number of planned participants was determined strictly by the depth of information the sample size was anticipated to be able to provide based on their knowledge and perspectives as they related to the theoretical basis for the study (Rubin & Rubin, 2005). The original plan called for six participants at each research site for the individual interviews to help bring a broad range of perspectives to the issue. The final study had a total of 9 participants. This sample size was due to the number of final volunteers who signed consents for the study. Because of the depth of information the sample would be able to provide through open-ended interviews sample size was sufficient for qualitative data collection (Rubin & Rubin, 2005).

Protection of Participants' Rights

Ethical standards for conducting research as established by Walden University and federal standards for the ethical and humane treatment of human participants were

followed in the administration of the data collection process. Participants' rights were highly respected me. I followed all methods and guidelines established by the local school, the district school board, the American Psychological Association (American Psychological Association, 2006; Creswell, 2009)., and the Institutional Review Board of Walden University.

All participants were informed in writing of the purpose of the study through a study invitation letter (Appendix A). They were given the assurance that their responses were confidential and that they had the right to decide that they will continue or withdraw from the study at any time. Parents who agreed to participate in the study were given a consent form that verified the conversation they had with the researcher. They were also given a copy for their own records. A copy of this form can be found in Appendix B. The consent form was used to explain to the participants their rights, including the opportunity to view the results of the study (Creswell, 2009; Fink, 2006). After the initial letters had been distributed, the researcher followed up with additional letters and emails to determine participant interest. Any risks were made clear to participants before data collection began. Interview transcripts are in the possession of the researcher and used only for the purpose of the study; transcripts and audio tapes of sessions are being kept securely in a locked filing cabinet by the researcher. Participants were also made aware of the study findings at the conclusion of the study. Participants were assigned a number so that their names would never be recorded on interview protocols. All information is currently stored in a secured filing cabinet that belongs to me. No information that could be used to identify the participants individually will be revealed except as required by

law. Data will be kept until January 1, 2020, and destroyed on that date by physical destruction of the USB drive and erasure of all electronic data files.

Role of the Researcher

My role as researcher in this study was that of the scientist. I collected, analyzed and interpreted the data. During the individual interviews, I worked directly with participants. All contact with participants was done by me. All member checking and analysis of data was conducted by me as well. I was not employed at the schools where data were collected, and had no power or influence over the participants.

It was critical that the data collection process be one that allowed for accurate and meaningful data collection. As such, a working relationship with study participants was established. At the beginning of each interview session, I initiated informal chat and conversation to allow the participants to feel at ease with me in the research setting.

There was no overt researcher bias, however, the bias that may have existed for me was that of holding the belief that parents are necessary in the educational process for student success. Being a teacher (i.e., in a different school), however, balanced this belief because I equally believe in the power of focused efforts by teachers toward student success. Hence, the intent was to focus on information from the perspectives of the parents who rear the children and who are contributing to their academic success in science.

Data Collection Procedures

Access for the study was gained after approval from the Institutional Review Board (IRB) of Walden University, the research and evaluation office of the school district, and finally the school principal. The letter that was mailed to the principal to

formally request his or her approval for the school to serve as the setting for this study is presented in Appendix C. After appropriate approvals were obtained, I invited parents to participate in the study. Invitation letters were sent by school courier to parents. After obtaining the maximum number of responses for interest in the participation in the study, all selected parent participants were contacted.

All data collection took place at the school sites. Individual interview sessions were on average 30-45 minutes. During the individual sessions, semi-structured questioning (Hatch, 2002) was used in the 7 question interview protocol (Appendix D). Individual interviews offered the opportunity for parents to answer questions as well as to speak candidly regarding the research questions. I used field notes to record information discussed by the participants and to use during member checking. All sessions were recorded using audio recording equipment. Follow up interviews were not used, because the necessary depth of information was able to be collected during the individual interviews.

Data Analysis

Information obtained during data collection was analyzed using categorical aggregation to focus on general themes that emerged. Data were also analyzed to determine whether the proposed research question and sub-question were answered (Creswell, 2007; Creswell, 2009; Yin, 2011; Merriam, 2002). In order to analyze information obtained during data collection, coding was conducted through a color coded system, presenting themes prevalent in parent responses. Data were analyzed to address the specific research questions. In order to analyze and validate the qualitative data collected in the individual interviews, information was processed to include suggestions

generally by Creswell (2009): I first reviewed the data by listening to all of the audio recordings to reflect on the meaning, impression, depth, and tone of the information for a general sense of the knowledge provided. Next, I transcribed all interviews. After transcribing, I organized the data into chunks to summarize and identify the substance of the information provided by the participants, using terms that were stated by the participants, and linking them to the general code of the question, as well as any subsequent questions and comments as it related to the types of parental involvement. I conducted member checking by asking for clarification of responses and by calling participants to ensure that I captured the full intention of their responses. I studied patterns that emerged in the responses of the participants, and gave specific examples by way of quotes from the participants. Once the patterns were examined, I tied the data collected and analyzed to the research questions to answer the research questions.

Validity and Reliability

Yin (2011) identifies validity as the "key quality control issue" (p. 78) in a study. The validity of a study is essentially what makes the results of use to the researcher. Ensuring that a study is valid means that the data collected represent an accurate picture of the population being studied. Validity and reliability for this study were ensured through respondent validation and triangulation (Maxwell, 2009). Respondent validation or, member checking, was conducted by contacting participants after interview sessions to review their responses to questions from the interview sessions. During respondent validation, participants were given the opportunity to confirm the intended meaning of their responses. This was done to ensure that there was a clear understanding of the meaning of participant responses. By collecting data from different individuals at two

school sites , triangulation, another validity strategy, took place. Collecting data in the same way by using the same interview protocol to guide the questioning with allowed for increased reliability and validity.

Summary

The purpose of this study was to examine parent involvement and its role in science achievement. The setting for the study was two elementary schools located in an urban Georgia school district. A total of 9 parents participated in the study. In order to answer the research questions, a collective case study qualitative design was used. Data were analyzed for trends, patterns, and themes reported by the participants. Results from the study are presented in the next section.

Section 4: Results

Introduction

The purpose of this study was to examine parent involvement and its contribution in the science achievement of successful science students. A collective case study qualitative research design was used in this study to collect data using a semi-structured interview approach, as suggested by Creswell (2009). The research questions guiding this study focused on parents of high-achieving science students and the kinds of parenting contributions they make that may have had a positive impact on their children's academic achievement. This section discusses the process by which the data were generated, gathered, and recorded; a description of the systems used for keeping track of data; emerging understandings; and the findings of the study.

Data Collection Process

I gained access to the two research sites used in the study, School A and School B (pseudonyms) following completion of the Walden University Institutional Review Board (IRB) approval process and receiving authorization from the principals of both schools. At each school, over 100 students met the criteria for participation. I commenced data collection by giving 50 invitation packets to the administrators of each site, which were sent to the parents of students who scored in the "Exceeds" category of the most recent Science CRCT. I invited a total of 100 parents to participate in the study and received 13 signed consent forms. I then scheduled individual interviews and collected data using the Interview Protocol (see Appendix D).

Data Tracking System

Each participant was assigned a number by which all documents relating to that participant were filed. All data were stored and organized using the participant numbers. These included consent forms, transcribed interviews, and member checking field notes. Documents were tagged based on their research location (School A or School B) and the assigned number of the participant. For example, all documents for the first participant in the study at School A was tagged with the number and letter combination A1 to represent their school location and order in the interview process.

During the interview process, all interviews were recorded using an Olympus Note Corder DP-10 digital audio recorder. Field notes were also taken during the interviews. The interview protocol, which was designed to ask questions addressing Epstein's (1995) six types of parent involvement and was guided by six pre-determined codes from which patterns and themes emerged. Interviews were then transcribed using the audio files and coded using a color-coded system. Participant responses were coded in the following way: Parenting (yellow), Communicating (green), Volunteering (blue), Learning at Home (orange), Decision Making (pink), and Collaborating with the Community (purple).

Findings

The research question and sub-question were developed within the context of the local problem of poor student achievement in science. Social capital theory anchored the study by providing a theoretical basis for considering the contribution of parent involvement as it relates to science achievement. I focused on the students who were exceeding the standards of the Science CRCT, using two overarching research questions

to guide the study The primary research question for this study was: What are parents of elementary school students who have high science achievement doing at home to supplement what is being taught at school? A secondary research question used to guide the inquiry of this study was: To what extent do parents of students with high science achievement assist in supplementing their children's academic achievement?

I collected data from individual interviews to address these questions using a qualitative, collective case study research design, as described by Creswell (2009).

Discrepant Cases

The original data collection plan called for a total of 12 participants. Fifty invitation packets were distributed at each research site. Thirteen total signed consent forms were returned, but only nine participants in the final study. Three potential participants indicated that they were unable to participate in the study due to scheduling conflicts and one potential participant did not respond to any of my follow-upcontacts. The original plan also had a focus group element, which was eliminated after participants did not attend the focus group portion of the study, and because the determination was made that the research questions could be addressed by the individual interviews alone.

Presentation of Tables

Table 1 presents descriptive data on the participants in the study. Tables 2-9 show the responses of each participant to the questions in the interview protocol. The interview protocol for this study was designed based on Epstein's (1995) six types of parent involvement, and therefore divided into six subgroups of activities.

The following tables represent each type of parent involvement and the questions in the interview protocol that correspond to each type. Each of these types will be

represented by the following headings: Parenting, Communicating, Volunteering, Learning at Home, Decision Making, Collaborating with the Community. Further discussion of emergent themes takes place in each narrative after the presentation of data in the tables.

Each participant in the study was African American. This sample was an accurate representation of the population of students in ABC Urban District, which has a mostly African American student body. Four parents were from school A and five parents were from school B. Six parents were female and three were male; all were in their 30s or 40s. Parents were not asked to reveal their profession as a part of the planned descriptive data, however, throughout the semi-structured interview sessions several revealed professional careers in education, journalism, law and business, with some parents revealing educational backgrounds or strengths in math and/or science. This sample of mid-career professionals is important to the data, as parents were both knowledgeable and confident in the activities they engaged in that related to their children's science achievement.

Table 1

Participant Demographics

School	Participants	Gender	Age	Race/Ethnicity
A	A1	Female	35	African American
A	A2	Female	42	African American
A	A3	Female	47	African American
A	A4	Female	32	African American
B	B5	Male	41	African American
B	B6	Male	36	African American
B	B7	Male	47	African American
B	B8	Female	44	African American
B	B9	Female	44	African American

Expectation of Achievement

One of the themes revealed during interviews was the parents' expectation of their children's academic achievement, particularly at the postsecondary level. Some factors influencing this were parent professional training, personal interest in math or science and evidence of achievement for older children of parents in the sample as well. The following direct quotes reveal more information that help to give a clearer understanding of participants in the context of the study.

Participant 1

- "There is one book that I look at. It's an older book and its made for every grade level. It's *What Your Child Should Know*. But you can go through it and kind of pull things out because I want my kids to go to college, so when they take certain tests sometimes you have to pull from what you learned in fifth grade so books like that, the classic books are good to have and keep in the house."

Participant 3

- "Our oldest daughter is currently at St. John's and she's in a pharmaceutical program. My son, who's about to graduate this year, he's back and forth. He wants to be a doctor."
- "…And he was like, 'If I don't become a doctor, there are so many other careers I could be other than a doctor that I can still be in the sciences'."

Participant 5

- "Mom has her math MBA in decision sciences. My undergrad is in accounting, but I don't use it. It's more business related. And so his uncle or technically his godfather is also a major in math, has his PhD in math methods and so he gets it from wherever we need him to get it."
- "I don't care where you go to school for your undergrad, as long as its an HBCU [Historically Black College and University], and you can get your MBA from wherever you want."

Participant 7

- "I have an older daughter. She's in Medical school at Harvard."

Participant 8

- "Since Kindergarten, Pre-K he went to a Montessori [school] because I'm very big on early education and I think once you can walk and use the bathroom, you can go to school."

Findings for Parenting

Interview question:

Question 1: What activities in your home do you believe encourage or enrich your children's science knowledge?

This question gets to the heart of the research. It asks parents to reveal what they actually do as it relates to science in their home. Participant responses to interview question 1 show the totality of participant responses to this particular question. They are represented in Table 2. The responses of parent participants indicate that parents of high-achieving science students are engaged in a variety of parenting activities with their children to encourage and enrich science achievement. Parents discussed activities such as supporting scientific core skills by teaching content, study skills, conducting experiments at home, communicating parent expectations, encouraging reading and talking with children about parent expectations.

Table 2

Findings for Parenting

School	Participants	Parenting Activities
A	A1	Requiring nonfiction text including science books Extracurricular science programs Talking with kids about what they learned at school Teaching science to kids to make up where school falls short (What Your Child Should Know is used as a resource) Setting the bar at home
A	A2	Cooking Teaching study skills and work habits so that child can pace herself on projects.
A	A3	Extracurricular science programs Make opportunities available for children to take part Talking with kids about career plans Doing science projects at home
A	A4	Using science kits Cooking Extracurricular science programs

(table continues)

School	Participants	Parenting Activities
B	B5	Encouraging children to ask and answer questions Communicating the importance of education Reviewing grades and work that is sent home Having family members with math/science backgrounds as resources Extracurricular science programs Ensuring that children retain respectful relationship with the teacher Making time for kids. Setting realistic expectations.
B	B6	Encouraging child to learn more about a science related career. Involving kids in a book club. Reviewing all work sent home. Setting the standard for good grades.
B	B7	Being very selective about the schools their children attend. Having family members with math/science backgrounds as resources Asking child about her work/grades.
B	B8	Allows child to do experiments at home Reads about Albert Einstein Encourages son toward math and science career Encourages reading
B	B9	Reading is encouraged. Family vacations are planned as experiences to support curricular studies

Science-Focused Extra Curricular Activities

The common thread that reveals itself as a theme in the discussion in the parenting type is involvement of children in extracurricular activities that have a science focus. For the parents in the sample, money was not a barrier to the participation of their children in these programs for two reasons: some programs were free and for programs that had a cost, they valued the programs highly and worthy of expenses they incurred. These responses reveal the culture of academic focus in the homes stemming from parent educational achievements, to their interest in science in some cases, to the support of other family members in science professions. The following are direct quotes from interviews addressing the theme of student involvement in extracurricular science activities.

Participant 1

- "I get them involved in programs that are free and available through the school system and [daughter] in particular, she has been involved for three years in the [district specific program] through [district specific school name] and from the first year she did it she fell in love with it. And all it is they bring in middle school science teachers and they do experiments and she does it over the summer."

Participant 3

- "I have my children participate in various extracurricular activities. They participated in the [district specific program] with [district specific school name]. They used to have it every Saturday, which I loved it like that and then they have I think for the last four years only the summer academy, which they would go for a week and at this point they don't have it. Also, I have two daughters and one

son and with my daughters what I do like right now is the big push for females to participate in STEM careers and activities so they are girl scouts and girl scouts has a very good connection with Georgia Tech and Georgia Tech has a lot of Saturday programs for girls to have hands-on activities. A lot of the science activities."

- "Some of them cost but they are minimum. Now the [district specific science program] was free which I loved!"
- "He wants to be a doctor, but now with him they used to have a really good program, they still have it, the Ben Carson Science Academy where he would go on Saturdays and they not only teach them the science curriculums and different activities, they teach them about future careers and start to put that seed in them about you know, everybody just says, "I want to be a doctor". They don't say what type of doctor, you know there are specialties. And then not everybody can be a doctor for whatever reasons. So like they…He came home and he was like, "Mommy, if I don't become a doctor…", because that was one of his things when he was like in first grade, "I'm gonna be a doctor when I grow up" Because everybody, "What are you gonna be when you grow up?" And he was like, "If I don't become a doctor, there are so many other careers I could be other than a doctor that I can still be in the sciences. You know they give them all of that. They tell them, and give them descriptions. So they don't have to be so generalized. They can be totally focused."

Participant 4

- "I have to say that we've done a lot of, I guess, extra-curricular type stuff to get her more involved, I guess, in science. It would be like the place that held the robotics camp, Imagine It Children's Museum. No, It's called Imagine That Science and Robotics. They focus on science, robotics and math and they have, like, Saturday classes, they have, like, workshops and all of that stuff, like, that you can take the kids to."

Participant 5

- "It was one with some acronym like Kids Interested in Science. They have a robotics camp. Both of them have been to a robotics camp. Chess camp. They've been to (forgot the name) but they create things. He's been to shark camp. Where at the end of the session they actually dissect a shark. They've done things we try to do things to just give them exposure because life is a whole lot more than just field trips at this age so they are used to doing things outside of just going to hang out."

Participant 9

- "We encourage them if they show any inkling into the planets, ok we're gonna go to Huntsville, you know, we're gonna go to the space museum."
- "He had been talking about planets, so we were like, 'Do you want to go to the space museum'? And then we kind of figured out what else can we do- Oh we can go visit the caves here, go to Chattanooga on our way here or our way back so we kind of did that and put something else into it."

Findings for Communication

Interview questions:

Question 2: How often do you communicate with your child's school regarding academics in general and science specifically?

Question 3: What kind of communication do you utilize? In person? Email? Note to teacher, etc?

Question 4: How do you determine when to communicate with your child's teacher? Do you do it daily, weekly, monthly, at the beginning or ending of a term, etc?

Participant responses for Table 3 show how each participant responded to question two. They indicated the frequency of communication for general academics in the first column and the frequency for science specifically in the second column.

Table 3

Frequency of Communication

School	Participant	Communicating: Academics in general	Communicating: Science specifically
A	A1	Twice a month	Not often
A	A2	Minimal to almost none	None specifically
A	A3	Daily	Monthly
A	A4	At least once a week	As needed
B	B5	Daily/As needed	None specifically
B	B6	Daily	None specifically
B	B7	Daily and Weekly	None specifically
B	B8	Once or twice a year	None specifically
B	B9	Periodic check once a month	None specifically

Participant responses for Table 4 answer question three. In this question, participants indicated all of the types of communication they use when contacting their child's school.

Table 4

Types of Communication Used

School	Participants	Types of communication
A	A1	Email, phone, Agenda planner
A	A2	Email
A	A3	Email, In person, phone
A	A4	Email
B	B5	Email, In person
B	B6	Agenda planner, write on test, In person
B	B7	Email, In person, Agenda planner
B	B8	Email, In person
B	B9	Email

Participant responses for Table 5 answer question four of the interview protocol. This question asked parents how they determined when to contact the teacher.

Table 5

When Communication with Teachers Occur

School	Participants	Communicating: When to communicate
A	A1	Daily in the agenda and if there is a problem
A	A2	Not often only if clarification is needed on directions
A	A3	Daily. Constant communication with teacher.
A	A4	As needed with questions about homework, clarification, issues with report card or to volunteer.
B	B5	Daily and when there are academic concerns.
B	B6	As needed based on teacher comments in the agenda planner and to communicate questions about grades.
B	B7	Weekly. General practice of checking in often but especially when performance is not up to expectations.
B	B8	Beginning of the school year to set the standard.
B	B9	Once a month with specific questions about grades.

Necessary Communication with Teachers

When parents do communicate with teachers, they do it as much as they believe is necessary for them to be knowledgeable about student progress and expectations. Parents in this study initiated contact in the manner they believe is most efficient in

communicating with teachers. The following are direct quotes from interviews providing details to further support this finding.

Participant 2

- "At this point she's in fifth grade so I would say minimal to almost none. She's pretty much on auto pilot at this point."
- "Not every often because she's kind of on autopilot. Even in 4th grade it wasn't often I was contacting them about anything other than maybe, hey we didn't understand the directions."

Participant 3

- "I talk to the teacher all the time (laugh). I'm the room parent-I'm just overly involved. Probably at least weekly if not daily. But on the sciences, probably, like I'm gonna say like monthly but um, yea."

Participant 4

- "Usually she doesn't take calls. You have to kind of catch her during her planning period so it's a little bit, I guess it's easier to send an email- that way she can answer it whenever she is able to. So email usually works a little bit better for her."

Participant 5

- "If there is an issue, I'm the one that will come up here and ask the questions."

Participant 6

- "The most frequent is writing. We usually write on the agenda we get back or the test. If its something like that project we talked about, we'll go in and speak to her and find out her reasoning why."

Participant 7

- "We write in that planner. Sometimes we email. I have trouble, it's a long email address and I just really…Her mom does a lot more email than I do, because I just rather sit down and talk to them because I work from home the majority of the time and can just shoot up here and get things done."
- "I try to communicate at all times even if its just I'm checking in to see how everything is going. But it becomes a priority when performance is not at an expected level, which is an A. So that's when I go, "Let's see if we can head this off before we go too far in the wrong direction."

Participant 8

- "I normally talk to her at the beginning of the school year because I like to set the standard of what I am expecting of her and of him."

Participant 9

- "Only if it's something that we have a question about. When I say communicate for the most part its for periodically a check in. How are things going? That would just kind of be if we see each other in the hall in the school or something, but as far as emails that's when I have a specific question about a grade he got back or an assignment. But I don't wanna say how often that may happen. Maybe once a month, maybe. Not very frequently."

Findings for Volunteering

Interview Question:

Question 5: What programs at your child's school do you volunteer or participate in that help to enrich his or her science achievement?

Participant responses for Table 6 show how each participant responded to question five. They indicated the programs parents volunteered in that enriched science achievement at the school. Responses in Table 6 show the wide range of responses.

Table 6

Science Volunteer Programs

School	Participant	Volunteering
A	A1	Book fair
A	A2	None
A	A3	Donating science materials to teacher
A	A4	None. Attempted to help with experiments but was not allowed
B	B5	None
B	B6	Jr. Executive and Beta Club
B	B7	Support during science fairs
B	B8	None
B	B9	None

Lack of Science-Related Volunteer Opportunities

School volunteerism in science is not prevalent. Some parent responses suggested that they believe teachers have a need for assistance in this area, but there are not many opportunities for volunteering in science at the school. Furthermore, parent experiences

vary when discussing the opportunities they have had to volunteer in science. The following are direct quotes from interviews providing more details.

Participant 4

- "In the past I've asked, because [daughter] likes to do experiments, but Ms.[teacher],well the fourth grade teacher was saying that they really didn't have enough time or resources to do it. So I said, "If you have, I can come", because at that time I was freelancing. I wasn't working like a set schedule so I said, "If you need me to come in to help to orchestrate some of these experiments, I can come in and help, so…"
- "The principal didn't want…didn't feel like they had enough time to insert it in the curriculum."
- "That was what I was told by the teacher."
- "I did not feel too great about it especially after having a conversation with her in regards to just the curriculum as a whole and what they have to focus on as a county as opposed to like what the school or what the teacher or student's class needs."
- "It did not [affect volunteerism]. I still did a lot because I had the time. This year is a little bit different where I don't have as much time to devote in the classroom so I'm kind of limited on volunteer efforts."

Participant 7

- "They do science projects on a regular basis and when they have science fairs and they display their work I usually try to come around and just volunteer to help or just support."

Participant 8

- "To be honest, I come and volunteer and I help out in the cafeteria. So whatever is needed at the time that I'm here. I've read to classes, not a science book per say, and I haven't participated directly in any science function, because there is so far I haven't seen any. I mean he says they go to classes and do [district gifted program] and different science projects but I don't have a time to volunteer to that extent where I can come and participate in the middle of the day in any science projects or class."
- "I know the school has a science lab, but I have never been it. I've seen it, but I never really engaged in it. I might have walked in there and picked up [son] like we gotta go, but I've never engaged in the lab itself to see what all the instruments or what kind of equipment they have or what kind of stuff they actually do. I just go off what he tells me."

Findings for Learning at Home

Interview Questions:

Question 6: What resources do you utilize at home to help your children with science related homework or projects? This includes hiring a tutor, websites, books and magazine subscriptions, etc.

Table 7 shows participants are using a variety of resources at home to help with homework and school related work.

Table 7

Science Resources Used for Assistance with Homework and Projects

School	Participants	Learning at Home
A	A1	National Geographic paper almanac, various websites
A	A2	Older sibling, books, websites
A	A3	Science and Society membership, internet, books
A	A4	Google, YouTube, Houghton Mifflin online books, BrainPop
B	B5	Google
B	B6	Parent guidance on projects, internet, dictionaries
B	B7	Parents assist daily with homework, use YouTube and Google
B	B8	Websites, YouTube, school recommended sites, online science textbook
B	B9	Internet, globe, books

Technology Learning Tools

The Internet is the primary resource for learning at home. Books, magazines and other instructional aides are secondary tools. This finding further strengthens the argument for strong STEM programs for students, because when the primary method of

independent learning, among a generation of digital natives, is dependent on technology, the need for instructional support for technology and other science related content is even greater. Technology, particularly the Internet, is a standard instructional tool for participants in the study. The following are direct quotes from interviews providing details for Learning at Home.

Participant 3

- "Mainly the internet. Long gone are the days when we had encyclopedias."

Participant 4

- "We do those, we use Google a lot like when she has homework just kind of either-Google and YouTube actually to go on or look at videos or just examples of what it is we are studying."

Participant 5

- "We are the Google kings and queens. Science is not necessarily my strong suite, so if we don't necessarily know the answer to something, we have to research it."

Participant 6

- "The computer would be the number one thing. Both him and his sister, they're fighting over the one computer and there is a laser printer hooked up to that so they are printing all sorts of things. "

Participant 7

- "The internet. Hands down. We have encyclopedias. They're in the closet. You remember encyclopedias used to be the thing."

Participant 8

- We go on websites. I've used from YouTube to whatever websites that the school recommends. Access to his school book, his science book on the Internet.

Findings for Decision Making

Interview Question:

Question 7: What opportunities have you had to help influence policy at the school level related to science? This includes opportunities from the classroom level to PTA, to the local school advisory board. Participant responses to this question are shown in Table 8. This table includes opportunities from the classroom level to PTA, to the local school advisory board.

Table 8

Opportunities to Influence Science Policy

School	Participant	Decision Making
A	A1	None
A	A2	None
A	A3	None
A	A4	None
B	B5	None
B	B6	None
B	B7	None
B	B8	None
B	B9	None

Note: The letters in the participant field indicate the location of the research site. The numbers indicate the number assigned to each participant.

Lack of Opportunity to Influence Policy

None of the participants experienced the opportunity to influence policy. One parent expressed that he did not realize that he could influence policy as a parent. For the sample of parents in the study, who otherwise are very engaged at various levels in the educational development of their children, school volunteerism did not seem as an effective tool in the success of their own children. Some of the parents expressed frustration with the PTA and negative experiences interacting with parents there. For one parent, the prospect of influencing policy was taken from the perspective of informally making changes based on the relationships he had already built within the school.

The following are direct quotes from interviews providing details for Decision Making.

Participant 2

- "I have to be honest. With my oldest daughter, I started out with the PTA and I found that the PTA was more of a way for the parents to tell the teachers how to do their job and it wasn't something I really wanted to do. I figured that people had gone to school, they have Master's degrees and PhDs and they really knew how to do their job. That's how I stepped out of PTA. At the school she was at it was the parents telling the teachers and it was always in an uproar and I was like, "This is not a good fit for what I want to do." If I have a direct problem with a teacher then I'll deal with it, if not then let me know you need me to cut some things out or if you need me to come to the classroom to help, but the PTA politics of it was too much for me."

Participant 7

- "Frankly, I've not had the opportunity, I've not sought out the opportunity to be quite honest. Nope . Have not. You would never think that I could influence something like that."
- "When I get in a group environment of parents, PTA, [unnamed club], or Student Council, Beta Club people. When I get in a room full of those parents, I tend to get annoyed. It seems that when parents start speaking up, they're grandstanding, they're asking very obvious questions and I get a little irritated and I kind of withdraw and I say, "Can I please get the information I need?" Then I'll leave."
- If it would be effective it would be far too much work to be able to get through to be able to make a difference because of all of the noise you'll have to fight through to get there.
- "I've been around [school B] forever so I feel as though I have relationships with some influential people here that if something was really crazy, I could sit down and have a conversation and be heard. But for what I think I have to contribute at this point, it's not been important enough in my opinion."

Findings for Collaborating with the Community

Interview Question:

Question 8: How have you collaborated with community members or community resources to gather relevant science resources for the children at this school?

Table 9 shows the variety of participant responses for the interview question. The majority of responses show a lack of collaboration between parents and community members for the purpose of gathering relevant science resources.

Table 9

Participants' Collaborations With the Community for Science Resources

School	Participant	Collaborating with the Community
A	A1	Social media connections, meeting up with parents at daughter's golf practice. Informal discussions sharing science resources
A	A2	None
A	A3	Talking with parents, building a network to find out what resources are out there.
A	A4	None
B	B5	None
B	B6	None
B	B7	None
B	B8	None
B	B9	None

Lack of Collaboration in the Community

The majority of parents interviewed are not collaborating or networking with community members to gather relevant science resources for children at the school. When asked this question, most participants simply said, "No". The findings for this question speak to the research questions of the extent that parents actually assist in supplementing their children's academic achievement. Within this sample, parents may limit their engagement to the kinds of things they feel they can directly influence their children's achievement. Collaboration with community members or community resources are activities that require a prerequisite confidence in that system to be able to provide a valuable resource. It requires trust in other stakeholders and the knowledge they may have to contribute. If no value is realized, then there would be no reason to collaborate. Going back to the initial description of the sample, many of the parents are educated individuals across many disciplines. They may not believe that they need to collaborate with others, because they may already know how to access the resources they need for their own children. The following direct quotes show the minority representation's actions for the Collaborating with the Community parent involvement type.

Participant 3

- "Asking other parents. Having that network of other parents to find out about things that are out there because I think that's our biggest loss especially in our communities in the sharing of information, the networking with each other. We're not very friendly people."
- "We want just our kids to be the best. I don't think it's a good thing. I don't want…but it does happen and it's still happening now. I want you to come up just

like I want me to come up then at least you see somebody that looks like yourself."

Evidence of Quality

During the interview process, I repeated responses to questions and asked follow-up questions to ensure that I was clear on what participants wanted to communicate in regards to each interview question. After the completion of all interviews, I transcribed and coded all interviews. Once all coding was complete, I reviewed the participant responses and entered my hand written responses to each question extracted from the transcribed interviews into the interview protocol used during the interviews. I contacted all participants by phone and briefly verified their responses to each interview question. I also asked clarification questions for those responses that were not clear. Upon completion of member checking, all data was organized into tables labeled by their codes, patterns were noted and themes were identified. Appropriate evidence may be found in Appendix C and F. .

Summary

The research question and sub-question focused on the practices of parents of students that were yielding high science achievement on the Georgia Science CRCT. An examination of the data revealed most activities of parents were focused on activities they felt they could directly influence, such as parenting practices, expectations and extracurricular programs. Parents communicated the practice of contacting teachers, using mostly email, in order to stay abreast of student progress and to communicate concerns. Parents were also very involved in learning at home, using the Internet for science-related homework and projects in all cases studied. No parents in the study

indicated influencing policy, and very few participants collaborated with community members to access relevant science resources for children at their schools.

Section 5 presents an interpretation of the findings of this study, implications for social change, and recommendations for action and further study. A researcher reflection will also be submitted in this final section.

Section 5: Discussion, Conclusions and Recommendations

Introduction

This study addressed a need to understand the problem of low science achievement among students in a local school district. Rather than focus on reasons for a lack of achievement, I decided to try to understand the parent involvement practices that may have contributed to high science achievement in elementary students. I wanted to answer the primary research question for this study: What are parents of elementary school students who have high science achievement doing at home to supplement what is being taught at school? A secondary research question used to guide the inquiry of this study was: To what extent do parents of students with high science achievement assist in supplementing their children's academic achievement?

My desire to gain a deep understanding of parent perspectives from multiple cases led to the selection of a qualitative, collective case study research design, as suggested by Creswell (2009). I collected data through one-on-one interviews with nine parents of students enrolled in the local school district; during these interviews, parents were candid and relaxed, and willing to share their experiences. These interviews employed semi-structured questioning to collected data.

This study was designed with social capital theory as its theoretical framework. Social capital theory states that in order for there to be a social return there must be a social investment (Hanifan, 1916). In the context of this study and science achievement, I focused on the high science achievement of a sample of elementary students and considered the kinds of social investments that their parents made, using a structure based on Epstein's (1995) six types of parenting. The study findings revealed that parents of

high-achieving science students were most active in activities that they felt they could more closely influence and control. These parents were intentional about the standards they set and the actions that they did to support their children educationally. They ensured that their expectations were communicated to their children, they had a relationship with their children's teachers, and ensured that their children had access to adequate resources to support and enrich their learning.

This final section presents an interpretation of these findings. It discusses the practical applications and how they relate to social capital theory. It also discusses these findings' implications for social change, presents recommendations for action, and suggests directions for further study. It also includes my personal reflections on my experience during this research process.

Interpretation of Findings

The purpose of this study was to examine parent involvement and its contribution to the science achievement of successful science students. The research protocol used for data collection focused on the six types of parenting according to Joyce Epstein (1997) Data analysis revealed the following themes: Expectation of Achievement, Science-Focused Extra Curricular Activities, Necessary Communication with Teachers, Lack of Science Related Volunteer Opportunities, Use of Technology Learning Tools, Lack of opportunities to Influence Science Policy, and Lack of Collaboration.

The first theme revealed by this study was the Expectation of Achievement. Parents stated that high academic achievement was important and the standard that they expected for their children. They listed their professional training, personal interests, and experiences raising other children as influencing their expectations of achievement.

These parents developed their expectations from those things that were familiar to them, and from things that they saw as having shown evidence of being beneficial in some way. Parents of successful science students also had high expectations of their children, which they communicated to their children and provided support for.

The second theme that was revealed was Science-Focused Extra Curricular Activities. Parents in this study believed that science experiences enriched their children's scientific knowledge and in turn contributed to their academic success. For these parents, money was not a barrier to participation: Some programs were free, and others were worth the cost. They also noted that science-related behaviors encouraged asking and answering questions, reading and research, and conducting experiments. For the parents in the sample, science was a part of their culture. This made experiences a part of their everyday life. Speaking of her child, one parent stated, "…[her daughter] has been involved for three years…" and "…from the first year she did it, she fell in love with it." Successful science students are a part of a culture of science that they enjoy.

A third theme that emerged was Necessary Communication with Teachers. Parent responses that asked how often they communicated with teachers and how they determined the frequency of those communications revealed that parents communicate often to understand expectations, clarify assignments, and get up-to-date student progress information. Parents initiated contact as much as they believed was needed based on the needs of their own child; the actual frequency of contact ranged included daily, weekly, and as needed. These findings show that parents of successful students want to partner with teachers in the process of educating their children. These parents know their children and understand how much close monitoring is needed to manage their academics.

The protocol question on school volunteerism and science achievement revealed a theme of a Lack of Science Related Volunteer Opportunities for parents. The parents that I interviewed recognizes that there is a need to volunteer, but are not clear on how to help fill that need. Parents are also not familiar with the resources the school has that they can take advantage of, thus possibly contributing to their lack of science volunteerism. The lack of opportunities may point to a larger problem of the lack of school-wide sponsored science activities, however the academic success of these parents' students shows that providing these opportunities is not necessary to student academic achievement in science.

A fifth theme that emerged from the data collection was Use of Technology as a Learning Tool. According to the parent-participants, the Internet was the primary learning resource used in their homes. Books, magazines, and instructional aides were secondary learning resources. This finding shows that students used technology as a tool in their studies over traditional books and resources. Utilizing technology as a tool for learning at home is an effective supplementary practice of parents of successful science students.

The Lack of Opportunities to Influence Science Policy was another emergent theme in the study. When asked about their past opportunities to influence science policy, the parents that I interviewed stated that they were not aware that they could influence science policy. They also expressed a lack of confidence in the effectiveness of PTA as a forum for collaboration between teachers and parents. This lack of being involved in activities to influence science policy did not affect the science achievement of their children as students, however.

The final theme revealed by the data was a Lack of Collaboration Within the Community. Most parents did not collaborate with others for resources. The study showed that parents were generally only focused on their own children and not the learning community as a whole. Their efforts were focused within their own families without evidence of looking outside of their families to other parents as resources. The lack of collaboration within the community is not a deterrent to science achievement.

The science students at the focus of this study were the beneficiaries of a combination of positive behaviors and practices. While Epstein (1997) identified six types of parent involvement, this study revealed that activities in all six types were not necessary for student achievement. For example, while one of the students in the study benefited from being in a book club, this may not be the most interesting and academically stimulating activity for other students. While one student enjoyed reading about Einstein, other students may not care to read about the famous scientist. The data revealed a consistent resolve of social investment among all of the parents. They determined what their children were interested in, and how they could support them. They then supported their kids' interests and the requirements from the school. Parents were parenting in a way that supported their children social and academically. While many of the practices discussed were specific to science during the interviews, the work habits developed, the expectations communicated, and the relationships built with teachers sent a deeper message to the students of support and presence. These students' parents made investments of social capital.

The most meaningful clarification of social capital in the context of this study is what Bourdieu (1985) called resurces through a network of shared interests. The

participants in this study mostly formed connections with their families and used their knowledge to add to their children's scientific understanding.

When interpreting the data, it is important to also consider the things parents did not do. They did not rely on the school to provide all of their children's educational experiences. Although the schools in the study were high achieving schools of which many of the parents seemed pleased, parents took it upon themselves to determine the extent of their children's educational experiences. They did not allow the school to define their children's science education completely.

There are some very practical points of application valid for anyone who is a stakeholder in the education of a child. The first one is that a child's education is not limited to the published curriculum. As a matter of fact, children are always learning and ready to learn. They use their experiences to build background, context and make connections. This study focused on science specifically, but the principles for those who work with children formally or informally are the same. Because children are always learning, parents and teachers need to pay attention to what children want to learn and where they exhibit strengths, natural inclinations and interest.

The second point of practical application is the implementation of curriculum does not end with the lessons taught in classrooms. It is repeated through homework, field trips, books, projects and opportunities to experiment and try new things. Children who exceed expectations on state assessments do so by having experiences that also exceed the normal classroom instructional experience.

The third point of practical application is children will succeed when they know that they are supported. To have support is not just to have teachers and parents, but also

to know that those supporters think highly of them. Successful students are that way because someone is their cheerleader. Someone is sacrificing so that they can succeed. Someone is making a big deal of celebration when they do well, and someone is also taking the time to address their challenges.

Implications for Social Change

While there are a number of things parents can take from this study and put into practice, there is a lesson for schools when filling the gaps with students who do not have the kind of parent support demonstrated by parents in the study sample. Schools have to demonstrate proactive and relevant practices that help to make up where there are parenting deficits. In response to the emergent themes from the study, the following are social change applications for teachers and school leaders:

Expectations of Achievement

In order to foster high expectations of achievement, parents need a reference point to base their expectations. They need realistic understandings of why scientific skills are necessary and useful in school and beyond. Schools need to make it their goals to communicate this to parents.

Science Focused Extra Curricular Activities

Science needs to be a part of school culture and not just a subject in school. It should be infused throughout the learning process. Scientific experiences should be easily accessible and included in every aspect of the learning curriculum. The value of extra curricular activities needs to he harnessed for the curriculum. There is potential value in the investment in more science field trips for students to have real life, career focused experiences while at school.

Necessary Communication with Teachers

Teachers need to create an inviting environment for parents to partner with them. Teachers and schools need to be more flexible and proactive about providing feedback and updates on student progress. Teachers need to find ways to provide ongoing communication with parents regarding expectations, assignments and student progress.

Lack of Science Related Volunteer Opportunities

Schools need to increase the kinds of school sponsored science related events. They also need to better utilize their resources and ensure students and parents are aware of how to help.

Technology Learning Tools

Teachers need to teach Internet research skills and Internet responsibility so that students can most effectively use the World Wide Web as a research and learning tool. Science focused software and programs should be used in computer labs and on technology tools such as iPads, laptops and tablets. Science related websites need to be made easily accessible to students as they learn.

Lack of Opportunities to Influence Science Policy

Schools need to reexamine how they use PTA as it relates to student achievement and school wide practices and policies. School leaders need to create meaningful forums for parents to communicate the things they would like to see in the school and to be a part of the design and implementation of those things.

Lack of Collaboration within the Community

Creating a sense of culture and community within the school is important in order for parents to want to collaborate with each other. This requires more trust among the stakeholders of the learning community.

The findings of this study have several implications for social change. At the two schools in the study, several changes are possible as a result of this study. Currently the parent involvement policies are heavily written to only address volunteerism at the school. The results of this study can help the administration of the schools to revisit what warrants as parent involvement as it pertains to parents fulfilling their parent involvement contractual duties.

Another social change that is possible is the increased conversations between the teachers and parents. Although parents and teachers have email, agendas and notes, they are generally discussing homework, academic progress and grades. Parents and teachers as a practice could begin to talk about the things that interest the child. Knowing what children are interested in would give teachers insight into making lessons interesting for students.

Recommendations for Action

The findings of this study show that parent involvement is an effective strategy for science success. Parents, teachers, administrators and school district leaders can all benefit from these results. While schools are not in control of parents and what they do in their own homes, schools can be a part of the parent involvement process by empowering parents with the information needed to assist their children. The following recommendations extend Epstein's (2005) guide to successful parent involvement

partnerships. These recommendations specifically address increasing science achievement:

1. Parenting: Schools need to give parents information on how to create and support scientific inquiry in their homes. Hosting events like curriculum nights, where parents come and learn about what their children are learning, is one way to accomplish this.
2. Communicating: Schools need to be clear with parents about what their children are expected to know in science, and they need to effectively communicate student progress, so that parents understand how to help their children to succeed. In addition to the standard progress reports, teachers need to consider using science skill checklists so that parents understand where their children are strong and where they need more development in science.
3. Volunteering: Schools need to provide more science-related opportunities for parents to volunteer. Some ideas are science fairs, science clubs, assisting with putting materials together for classroom experiments, and providing a platform for parents who work in science careers to be a part of the teaching process.
4. Learning at Home: Schools need to ensure that teachers are assigning meaningful homework tasks and projects that allow students to expand their scientific understandings. Schools also can provide parents with resources needed to assist their children with science, such as subscriptions to online textbooks, websites and supplemental materials.
5. Decision making: Schools need to clearly communicate with parents so that they understand their decision-making rights as members of the school community.

Policies and practices that impact science need to be discussed. While every decision made regarding the school cannot be brought to a direct vote, schools can make sure that parents are given ample opportunities to speak on matters relating to science instruction and science in the school community. While doing this could reveal or expose current problems that exist, once addressed, it would increase parent confidence in school transparency and provide a valuable partnership with parents in the joint effort of the education of their children.

6. Collaborating with the Community: Schools need to partner with organizations that will bring programs and resources needed so that students can have better access to science learning within the school and in the local community.

The results of this study, as well as recommendations for action, will first be shared with the local school district through their research and evaluation department, the participating schools and study participants. I also want to share what I learned with parents, teachers, and other stakeholders as an educational leader. I want to engage others into the conversation through books, blogging, talks, various social media outlets, and through my efforts working with my local PTA focusing on parent engagement for the coming school year.

Recommendations for Further Study

In order to better understand what it will take for students to become more proficient in science, further study needs to be conducted to determine how learning communities can give students the support they need to be motivated to learn science, and to help address learning deficits and gaps that exist. Science instruction should be examined to focus on the best practices of the teachers of successful science students. I

recommend further study with more of a focus on how students enjoy learning science. From the qualitative perspective, interviewing students to determine their favorite instructional methods and least favorite instructional methods is one idea. Studying what students enjoy doing inside and outside the classroom will help to better connect the instruction of the classroom to what is meaningful to students.

Researcher Reflection

I came into this study as a veteran educator who has known the challenge of teaching science within the demands of the public school system. When I decided to focus on the population of the parents of successful students, it really was from the position of wanting to know because for many years I was puzzled about what made some students very successful while others struggled.

I began this process reading through countless articles and studies to form the foundation for my understanding of what I was to explore. Having been a science teacher, I did not only want to know my experience, but what other teachers struggled with in the classroom. In this process, I got a greater understanding of the current issues and some of the efforts to address them. Once I began collecting the data, I became extremely excited. Talking to parents was the best part of this process. As a matter of fact, this kind of data collection was very enjoyable to me, because it became alive. I did not only look at test scores on a page, but I had an opportunity to engage with parent participants and really make connections to all of the research I had been studying. After the interviews were complete, I began the process of digging through the data to make connections and to analyze and come to a greater understanding than I entered into this process with. When I began seeing just how connected one parent's experience was to others, I began realizing

that I was on to something big. I was showing just how important parents are and proving data to present to the community with a focus on student success.

The most difficult part of this process has been in tying it all together. It is quite challenging to tie a research question to a conceptual framework, reporting and analyzing the data and looking for new questions or more approaches to research that could be born out of this study.

This process has changed me as a researcher. I have learned to question and to read for meaning and how to make connections to the scholarly research in the field. This process has changed me as a person. I have learned how to push myself beyond even what I believed was possible and how to expect more of myself even when life presented some incredibly challenging circumstances. I am excited about what comes next as I develop as an educator and as a researcher. I have even more questions, and I cannot wait to start asking them.

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Appendix A: Invitation Letter to Parents

787 Deerfield Court
Stone Mountain, GA 30087
Samara.waller@waldenu.edu
404-395-1539

August 1, 2013

Dear Parent:

My name is Samara Waller. I am a doctoral student working on my dissertation at Walden University. With this letter, I would like to invite you to participate in a study being conducted at your school entitled "Parent Involvement Practices of High Achieving Elementary Science Students".

The purpose of this study is to examine parent involvement and its role in the science achievement of elementary students. My main objective is to collect information that can be used to help improve the performance of the students in science. As a part of the study, I will be interviewing parents of students in grades four and five who have scored in the "exceeds" category of the most recent science CRCT. All interviews will be held at the school.

Parent participation in this study is completely voluntary and confidential. There are minimal anticipated risks associated with participation in this research study. As a parent, there is no direct benefit to you for your participation in this study. The benefit to society would be the contribution to the body of knowledge on science student achievement and parent involvement.

Any questions about the study may be directed to me or the chairperson of my Dissertation Committee at Walden University. Dr. Fatima Mansur may be contacted at fatima.mansur@waldenu.edu. I look forward to meeting with you to discuss any other questions you may have.

Sincerely,

Samara Waller

Appendix B: Consent Form

787 Deerfield Court
Stone Mountain, GA 30087
Samara.waller@waldenu.edu
404-395-1539

September 10, 2013

Dear Potential Participant:

My name is Samara Waller. I am a parent of a student in this school district, an educator, and a doctoral student working on my dissertation at Walden University. As a vested member of this community, I am very interested to talk with parents as it relates to science and student achievement. I invite you to be a participant in this research study.

Purpose of the study:
The purpose of this study is to examine parent involvement and its role in the science achievement of elementary students.

Procedures:
This study will be comprised of individual interviews. I will be interviewing parents of students in grades four and five who have scored in the "exceeds" category of the most recent science CRCT. All interviews will be held at the school. The interview sessions will be recorded using audio equipment. The individual sessions will not last over 60 minutes. After the interviews, I will contact you for a brief verification of your responses during the interview sessions.

Voluntary Nature of the Study:
Your participation in this study is completely voluntary. It is requested that you answer all interview questions, however at any time, you may choose not to answer one or more questions. You may also choose to stop participating in the study at any time for any reason. All responses will be kept confidential. It is requested that you keep a copy of the consent form for your records.

Risks and Benefits of Participating in the Study:
There are minimal anticipated risks associated with participation in this research study. As a parent, there is no direct benefit to you for your participation in this study. The benefit to society would be the contribution to the body of knowledge on science student achievement and parent involvement.

Compensation:
No monetary compensation will be given for the study. It is strictly voluntary.

Confidentiality:
All interview transcripts will be kept by the researcher. Only the researcher and the assigned Walden University dissertation committee members will have access to the raw data. Participant, school, and school system identities will all be kept confidential by the researcher. Paper copies and digital copies of interview transcripts will be kept in the possession of the researcher and used for the purpose of this study.

Questions about the Research:
Any questions about the study may be directed toward me, the researcher, at samara.waller@waldenu.edu or at 404-395-1539. You may also direct your questions to the chairperson of the dissertation committee at Walden University. Dr. Fatima Mansur, the committee chairperson, may be contacted at fatima.mansur@waldenu.edu. Any questions about your rights as a study participant can be directed to Walden University's Research Participant Advocate 612-312-1210 or email irb@waldenu.edu. Walden University's approval number for this study is 06-19-130079360 and it expires on June 18, 2014.

Statement of Consent:
I have read the information regarding the research study provided. I understand that by signing this consent form, I am agreeing to participate in this study.

_____ _____
Printed Name email address

_____ _____
Signature Telephone number

_____
Date

_____
Signature of Investigator
Samara Waller

Appendix C: Letter to the Principals

787 Deerfield Court
Stone Mountain, GA 30087
samarawaller@gmail.com
404-395-1539

August 1, 2013,

Dear Principal _____:

My name is Samara Waller. I am a doctoral student working on my dissertation at Walden University. With this letter, and the attached study proposal, I would like to ask for your permission to conduct a study in your school entitled " Parent Involvement Practices of High Achieving Elementary Science Students".

The purpose of this study is to examine parent involvement and its role in the science achievement of elementary students. My main objective is to collect information that can be used to help improve the performance of the students in science. As a part of the study, I am seeking permission to interview parents of students in grades four and five who have scored in the "exceeds" category of the most recent science CRCT. We will need a room to hold individual interviews.

Parent participation in this study is completely voluntary and confidential. There are minimal anticipated risks associated with participation in this research study. As an administrator, the only benefit that you would experience would be the knowledge of knowing that you are helping to contribute to the body of knowledge on science student achievement and parent involvement.

Any questions about the study may be directed to me or the chairperson of my Dissertation Committee at Walden University. Dr. Fatima Mansur may be contacted at fatima.mansur@waldenu.edu. I look forward to meeting with you to discuss any other questions you may have.

Sincerely,

Samara Waller

Appendix D: Interview Protocol

Research Question: What are parents of students who have high science achievement doing at home to supplement what is being taught at school? The sub question will consider: To what extent do parents of students with high science achievement assist in supplementing their children's academic achievement?

- Male ____ Female ____
- Age _____ Race/Ethnicity _____

I'd like to talk about the kinds of activities you have participated in the past, or what you are currently involved in that relate directly to student achievement and more specifically, science achievement.

1. What activities in your home do you believe encourage or enrich your children's science knowledge?
2. How often do you communicate with your child's school regarding academics in general and science specifically? What kind of communication do you utilize? In person? Email? Note to teacher, etc?
3. How do you determine when to communicate with your child's teacher? Do you do it daily, weekly, monthly, at the beginning or ending of a term, etc?
4. What programs at your child's school do you volunteer or participate in that help to enrich his or her science achievement?
5. What resources do you utilize at home to help your children with science related homework or projects? This includes hiring a tutor, websites, books and magazine subscriptions, etc.

6. What opportunities have you had to help influence policy at the school level related to science? This includes from the classroom level to PTA, to the local school advisory board.
7. How have you collaborated with community members or community resources to gather relevant science resources for the children at this school?

Appendix E: Science CRCT Data at Research Sites A and B and District X

Table A1

Science CRCT Data at School "A" for Years 2010-2013

	Grade 3	Grade 4	Grade 5
2013	86.2	81.5	72.5
2012	83.9	81.8	77.3
2011	85.4	82.5	79.2
2010	89.0	81.4	78.8

Note. Values enclosed represent the percent of students who met or exceeded the standard on the Science CRCT for that year.

Table A2

Science CRCT Data at School "B" for Years 2010-2013

	Grade 3	Grade 4	Grade 5
2013	78.2	85.1	76.7
2012	77.1	89.1	78.2
2011	93.0	91.0	89.4
2010	92.9	94.3	87.1

Note. Values enclosed represent the percent of students who met or exceeded the standard on the Science CRCT for that year

Table A3

Science CRCT Data at District "X" for Years 2010-2013

	Grade 3	Grade 4	Grade 5
2013	65.1	69	63.2
2012	65.1	68.4	62.6
2011	69.1	66.4	64.8
2010	70.1	67.2	64.5

Note. Values enclosed represent the percent of students who met or exceeded the standard on the Science CRCT for that year.

Appendix F: Sample Interview Transcript and Coding

PARENT: I think reading is definitely a plus in helping them understand more advanced texts in sciences. In terms of vocabulary it's a little bit more advanced for the most part. Yes, definitely.

INTERVIEWER: What programs at your child's school do you volunteer or participate in that help to enrich his or her science achievement?

PARENT: To be honest, I come and volunteer and I help out in the cafeteria. I do whatever is needed at the time that I'm here. I've read to classes, not a science book per say, and I haven't participated directly in any science function, because there is so far I haven't seen any. I mean he says they go to classes and do Discovery and different science projects but I don't have a time to volunteer to that extent where I can come and participate in the middle of the day in any science projects or class.

INTERVIEWER: What resources do you utilize at home to help your children with science related homework or projects? This includes hiring a tutor, websites, books and magazine subscriptions, etc.

PARENT: I do both. I help him with homework and project. We go on websites. I've used from YouTube to whatever websites that the school recommends. Access to his school book, his science book on the internet. But programs, when he was younger he watched "Sid the Science Kid" and I used to watch "Baby Einstein's". Maybe that's where he got interested in [Albert]Einstein. I have no idea. Baby Einstein's was the program that came out on DVD, and I did buy like 2 or 3 of the DVDs and used to enjoy watching them.

INTERVIEWER: What opportunities have you had to help influence policy at the school level related to science? This includes from the classroom level to PTA, to the local school advisory board.

.PARENT: Sorry none.

INTERVIEWER: How have you collaborated with community members or community resources to gather relevant science resources for the children at this school?

PARENT: No.

Coding Key: Six Types of Parent Involvement

Parenting	Communicating	Volunteering	Learning at home	Decision Making	Collaborating with the Community
Yellow	Green	Blue	Orange	Pink	Purple