View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by DigitalCommons@Robert W. Woodruff Library

ABSTRACT

EDUCATIONAL LEADERSHIP

HUNTE, STEPHANIE V. B.A. LONG ISLAND UNIVERSITY, 1995

M.A. HOFSTRA UNIVERSITY, 1996

HOLDING THE VILLAGE ACCOUNTABLE: A COMPARATIVE CASE STUDY OF TWO ECONOMICALLY DIVERGENT COMMUNITIES TO INVESTIGATE THE EXTENT SOCIAL CAPITAL IMPACTS STUDENT ACHIEVEMENT IN STEM

Committee Chair: Shelia Gregory, Ph.D.

Dissertation dated May 2016

This dissertation explores the extent social capital and social networking impact student achievement in STEM within communities of divergent affluence and influence. The lack of parity of academic amenities within communities, including academic tutoring, math and science classes, and workshops tend to impede student achievement within the schoolhouse. Therefore, activities occurring within households result in each community's ability to serve as either a bridge or a barrier to student academic success. The author argues that through community mobilization to drive further access to community-based academic resources, students can be connected to opportunities to nourish their STEM competencies, which will lead to increased success in the core STEM courses of mathematics and science. Communities with higher socioeconomic standings have an embedded innate framework of networking through associations and

affiliations. Due to these memberships in a cross-section of activities, including neighborhood associations, parent groups, and civic organizations, there is a natural ebb and flow of communication and action that encourages opportunities to emerge for the benefit of its community's children.

The author investigated the relationship between student STEM achievement in school and the ability of families to access academic opportunities outside of the school environment. Data collected included an array of primary and secondary sources, student state test scores, and program marketing documents of STEM education providers. To further explore the relationship between variables, surveys completed by community stakeholders and parents were distributed and analyzed.

The quality of instruction occurring within community-based STEM opportunities was measured through analyses of survey instruments and documents, curriculum standards, and approaches to learning.

HOLDING THE VILLAGE ACCOUNTABLE: A COMPARATIVE CASE STUDY OF TWO ECONOMICALLY DIVERGENT COMMUNITIES TO INVESTIGATE THE EXTENT SOCIAL CAPITAL IMPACTS STUDENT ACHIEVEMENT IN STEM

A DISSERTATION

SUBMITTED TO THE FACULTY OF CLARK ATLANTA UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF EDUCATION

BY

STEPHANIE V. HUNTE

DEPARTMENT OF EDUCATIONAL LEADERSHIP

ATLANTA, GEORGIA

MAY 2016

© 2016

STEPHANIE V. HUNTE

All Rights Reserved

ACKNOWLEDGMENTS

Sankofa means remembering the past with careful reflection which enables us to proceed with wisdom into the future. With gratitude, as I look back upon this journey, I must thank family, friends, and colleagues who have been a well of inspiration, motivation, and knowledge. Without the selfless support of my "village," making it to this point in my journey would not have been accomplished. Dr. Kaemanje Thomas, I love you more than words can express. You are love and light. Brenda Coleman, you are a God send. Through you, I began to shape my understanding of how powerful community agencies can be when their heart is calibrated to the people and not to programs.

To my daughters, Ava and Eden, we are graduating together. Many a night, you traveled with me to campus and attended classes and became unofficial members of my doctoral cohort. When I cross the stage, we will do so together. To my mother, Brenda, you are the singularly greatest force in my life. Maria, Mike, Travis, and Lexi—your encouragement has meant everything. I have the best family in the world. Dr. Sheila Gregory, you have been my chair and my champion. You pushed me to question, to establish a stronger line of inquiry, and to become a more refined scholar.

To my dissertation committee, Drs. Grove, Turner, and Hill, I could not have asked for a more reflective contingent of transformational thinkers who serve as a catalyst for educational reform for black and brown youth.

TABLE OF CONTENTS

ACKNOWLEDGMENTS iii

LIST OF FIGURES vii

LIST OF TABLES viii

CHAPTER

I. INTRODUCTION 1

Purpose of the Study 14

Background of the Problem 15

Statement of the Problem 17

Significance of the Study 18

Research Questions 18

Summary 19

II. REVIEW OF THE RESEARCH LITERATURE 20

Organization of the Review 20

Emergent Themes 22

Summary 42

III. THEORETICAL FRAMEWORK 43

Theoretical Design 43

Theory of Variables 44

Definition of Variables and Other Terms 46

Relationship among Variables 48

Limitations of the Study 49

Summary 49

CHAPTER

IV. RESEARCH METHODOLOGY....51

Research Design....51

Description of the Setting....53

Sampling Procedures....57

Working with Human Subjects....57

Instrumentation....58

Data Collection Procedures....61

Statistical Application....62

Summary....62

V. ANALYSIS OF THE DATA....63

The Setting....64

Analysis of the Data....66

Summary....106

VI. FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS....107

Purpose of the Study....107

Research Methods....107

Findings....108

Implications....115

Limitations of the Study....119

Recommendations....120

APPENDIX

A. Website Analysis of STEM Academic Amenity Provider 124

B. Outline and Definition of Themes from STEM Academic Amenity Provider Websites 130

C. Parent Survey 132

D. Community Resource Provider Survey 140

E. School Stakeholder Survey 150

F. Stakeholder Interview 153

G. STEM Advisory Member Interview 155

H. Document Analysis 157

REFERENCES 158

LIST OF FIGURES

Figure

1. Comparison of Polaris and Octantis communities' student achievement in high school math 10
2. Comparison of Polaris and Octantis communities' student achievement in high school 10
3. Comparison of Polaris and Octantis communities' middle school student achievement in math 11
4. Comparison between Polaris and Octantis communities' elementary Students 11
5. Comparison of Polaris and Octantis communities' elementary students in math 12
6. Bridging social capital and STEM achievement 21
7. Joyce Epstein's framework of six types of involvement 28
8. Using the revised taxonomy in an adaptation from the Omaha public schools 32
9. Bloom's Taxonomy 44
10. Relationship between independent and dependent variables 45
11. Social capital and community mobilization for student achievement 49
12. Complexity levels of instructional strategies offered by academic amenity providers 88

LIST OF TABLES

Table

1. Demographic Comparison of Polaris and Octantis Communities 55
2. Instrumentation Matrix 60
3. Demographic Data of Parental Survey Respondents 65
4. Parental Perception of Student Achievement and Academic Community Resource 69
5. Parental Involvement and Student Academic Support 73
6. Social Media Use between Parents and School Personnel 76
7. STEM Academic Provider Demographics 78
8. STEM Academic Amenity Participant Recruitment and Program Access 80
9. School Stakeholder Survey 84
10. Alignment between Program Content and State Standards in Math 90
11. Assessment of Learning by Participants of Academic Amenity Providers 94
12. Stakeholder Interview Outline and Definition of Themes 98

CHAPTER I

INTRODUCTION

Throughout the history of formal education within the United States, disparities have existed. Whether through de facto practices to create structural inequalities to limit access opportunities for specific racial or gender groups or through a myriad of de jure local laws prohibiting education attainment of segments of the population, the educational landscape has been fraught with uneven access. Through congressional legislation, inequities have been addressed through the establishment of federal mechanisms to bar access impediments previously sanctioned by local districts and schools. The tumultuous Civil Rights Movement of the 1950s and 1960s experienced its first early victory with the 1954 landmark Supreme Court case of *Brown v. Board of Education of Topeka*, which eradicated state-sponsored race-based segregation and opened the door for a flood of subsequent legislation to enable students across all demographics to have the same instructional opportunities (Zirkel, 2005). However, changes in policy cannot address, nor trump, the abilities of social groups to exercise their ability to extend expanded direct access to resources to their community's children. Community support garnered through inherent social capital enables affluent schools to add layers of additional unfettered funding through the establishment of business partnerships and foundations to provide children increased academic support in outside of school activities. Additionally, the norms existing within communities to share

information, engage in school-community initiatives and invest available out-of-school academic opportunities lead to additional disparities. This supply and demand dynamic further pushes forth more opportunities in and outside of the school setting for affluent schools. Conversely, without the social capital to demand more academic services, less affluent communities do not experience the same quality and frequency of services. The author posits that these two core factors—individual family demographic factors and attitudes towards parental involvement which provide membership into a social network and the collective community and social capital when individual families band together to establish networks of influence—have a significant impact on student achievement in subjects related to science, technology, engineering, and mathematics (STEM), specifically science and mathematics.

Since 2000, with the inception of the triennially administered Programme for International Student Assessments (PISA), national concern has erupted regarding the backward slide of American prowess in academic achievement in science and mathematics. The 2012 results for the PISA, a comparative case study to gauge learning attainment across nearly six dozen school systems worldwide conducted by the Organization for Economic Cooperation and Development (OECD), found that "among the 34 OECD countries, the United States performed below average in mathematics in 2012 and was ranked 27th; the U.S. PISA ranking in science was 20th. Each of the five previously administrated PISA exams focused primarily on mathematics, although it also included both science and literacy, to assist participating nations in their improvement of quality, equity and efficiency within their systems (Organization for Economic Co-

operation and Development [OECD], 2014). Outpaced by numerous nations, including Canada, Finland, and the Chinese provinces of Shanghai and Macao, the nation has experienced mounting alarm over concern that growing industry sectors, including the sciences and engineering, will not have an adequate labor force needed to support American business growth. Lee and Mather (2008) stated the following:

> Nationwide, there were 7.5 million scientists and engineers (including social scientists and technicians) in the United States in 2006, representing 5% of the total workforce. Much of the research and debate has focused on a single question: Does the country have enough scientists and engineers to compete in the increasingly high-tech global economy? (p. 11)

If the academic reality of the United States' heterogeneous student populous failing to competitively perform against students in other nations continues, then today's children will not have the qualifications and skill sets to assume positions in the burgeoning global STEM industry. Therefore, efforts have been made to shore up skills needed to advance student competencies in the core STEM areas of mathematics and science. Within the state of Georgia, the Department of Education has begun awarding STEM certification to schools. Regarding one recent awardee, the Superintendent of Schools was noted as stating,

> This program is a shining example of what high school can do to help prepare students for the 21st century workforce. [This school] and other STEM-certified programs across the state will help fill the void of STEM professionals in Georgia's workforce market by tapping into students' passion for science,

> technology, engineering and mathematics. (STEM Georgia, 2014, www.stem georgia.com)

Education decision makers perceive a link between the necessity to prepare students in the math and science P12 setting and STEM career advancement.

Within the metropolitan area of the state capital of Atlanta, comprised of 14 counties which educate 46% of the state's children, schools and school programs designed to enhance students' science competencies have emerged. With a mission statement, which includes creating opportunities for underserved youth and empowering educators to foster STEM learning within their classrooms by bridging partnerships between schools and technology organizations, the education arm of the Technology Association of Georgia is one of several collaborative efforts rooted in supporting students' STEM development. These efforts are indicative of the concerted shift to STEM learning within the state (Technology Association of Georgia [TAG], 2014).

It is questionable whether all schools have equal footing to compete within the academic disciplines of math and science due to affluent areas potentially heightened social capital manifesting in the form of additional funding, more extensive parental volunteer support and technical expertise in community group collaboration. Sociologist James S. Coleman (1988) asserted that two distinct perspectives of social action work in concert collectively to create a dynamic to push actors towards decision-making—individual imperatives and group norms. According to Coleman,

> Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of

> social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure. Like other forms of capital, social capital is productive, making the achievement of certain ends that in its absence would be impossible. (p. 98)

These social capital factors can be used to acquire additional instructional STEM learning opportunities and through the application of social capital embedded within demographically stratified neighborhoods, increased parental participation can be galvanized to spur the development of increased learning opportunities. Social capital can build critical mass to increase community objectives. Through efforts to educate families about their social capital capacity, they can leverage the opportunities available within their community to increase their children's exposure and competency to STEM content and skill sets. By evaluating their values and norms regarding the sharing of information, both affluent and economically disadvantaged communities can remove impediments which bar accessing community resources for students' academic good.

With the adoption of the Common Core standards by 43 states as of the fall of 2013, including Georgia, state legislators have acquiesced that the nation must create an educational culture that offers both challenging and uniform curriculum (Common Core State Standards, 2014). How each district, school, and classroom implements and reach student academic success is, however, a grey area considering that each school's demographic composition, culture and previous academic achievement is unique. Schools and communities do not have access parity. Students' developmental assets vary greatly and opportunities to provide individualized learning through classroom

instructional differentiation are not assured. The certification system used in the State of Georgia is under the auspices of the Georgia Professional Standards Commission (GaPSC) and is codified within Georgia state law under the *Certification Rules* subsection (GaPSC). However, the rules obtained by the GaPSC do not include a set of cogent instructional expectations educators are to master and implement within classrooms. Therefore, instructional expectations will differ from district to district and school to school, and since the Common Core curriculum assigns standards for content and not strategies for learning, developing critical thinking and problem solving capacities essential to deep understanding of math and science principles is also not assured.

The Common Core provides the "what" in terms of content for mathematics and language arts but does not prescribe the "how." The "how" or means, educators use to articulate teaching to achieve student learning is developed through staff training and expectations established by districts and schools. So although problem solving, collaboration, communication, and critical thinking skills are interwoven into the standards as amorphous statements of standard expectations, concrete methods linked to instructional strategies to elevate these skills among students are not mandated for implementation (Common Core State Standards [CCSS], 2014). For example, the Common Core State Standards state,

> Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a

> letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (CCSS.Math.Content.4.OA.A.3)

The Common Core standards outline outcomes without including pedagogical strategies to achieve student success in each standard. Educators will therefore select teaching strategies to engage students based on their own level of teaching expertise and discretion to reach and teach their students. For the aforementioned standard, teachers would need knowledge of their students' reading ability and reading strategies to assist in decoding word problems prior to applying mathematical operations. Thereafter, adept teachers would support their students' development further by incorporating strategies that employ Vygotsky's Social Development Theory to encourage sufficient challenge to stretch students' abilities while avoiding activities and content that fall within a realm students' deem too difficult (Vygotsky, 1978).

Cohen and Hill (2000) noted within their study, "Instructional Policy and Classroom Performance: The Mathematics Reform in California," that instructional practices have a powerful impact on student performance. When educators were offered the opportunity to develop and learn intellectually ambitious instruction for more mathematically engaging work for students, and how to help students understand mathematics rather than just memorizing facts and operations, this shift in instructional framework led to increased student performance (Cohen & Hill, 200). Therefore, setting the bar high regarding the level of taxonomy used can impact student achievement whether that learning is occurring in a formal setting, such as a grade level classroom or

through experiential experiences that are delivered by community education practitioners in workshops, classes, or camps.

For students within each individual school, identifying the contributing factors leading to the varied achievement among students can provide a road map for establishing a model for solidifying community inputs integral in achieving student academic success. By investigating whether high achieving students in a lower socioeconomic school setting experience parental engagement in school activities, parental educational attainment, and higher exposure to academic content outside of out-of-school on par with students in higher socioeconomic school settings, models for community engagement can be established to develop a school-home-community ecosystem equipped to attract and retain academic amenities. Isolating all other school input factors and investigating the activities controlled by students' parents can demonstrate the extent of impact this leads to student achievement in the core subjects of mathematics and science. The author posits that the decision-making of parents regarding the learning activities their children engage in outside of school across socioeconomic levels will have the same outcomes regardless of the socioeconomic levels of their communities. The science standards established by the Georgia Department of Education mirror those of the National Research Council's National Science Education Standards (Georgia Performance Standards [GPS], 2014). State achievement data within this core area, as well as within mathematics, show that overall, students in lower socioeconomic communities experience lower achievement. Data provided by the Governor's Office of Student Achievement, illustrate the academic

divide experienced by students residing within households with differing socioeconomic status. Non-disadvantaged students demonstrate more than twice the "exceed" achievement in both science and mathematics than their economically disadvantage counterparts, based on the state administered Milestones examinations which are used within the College and Career Ready Performance Index (CCRPI), are held each spring. CCRPI is a comprehensive school improvement, accountability, and communication platform for all educational stakeholders that will promote college and career readiness for all Georgia public school students (Georgia Department of Education [GADOE], 2014). The latter also exhibits a higher failure rate in these two core subtests of math and science, with a one in five and nearly one in three failure rates respectively. CCRPI data for each setting's middle schools reveal that Polaris' school earned nearly all total achievement points available to earn a total CCRPI score of 95 while Octantis' middle school earned only 34.9 points of the available 60 content mastery points to achieve an overall score of 52.9 points. Data from each respective high school mirrored the same achievement data with Polaris' high school earning a CCRPI score of a 93.4 and Octantis earning a CCRPI score of 49.7 points. Figures 1 through 5 compare high school, middle school, and elementary school student achievement in STEM of Polaris and Octantis communities' for academic year 2012-2013.

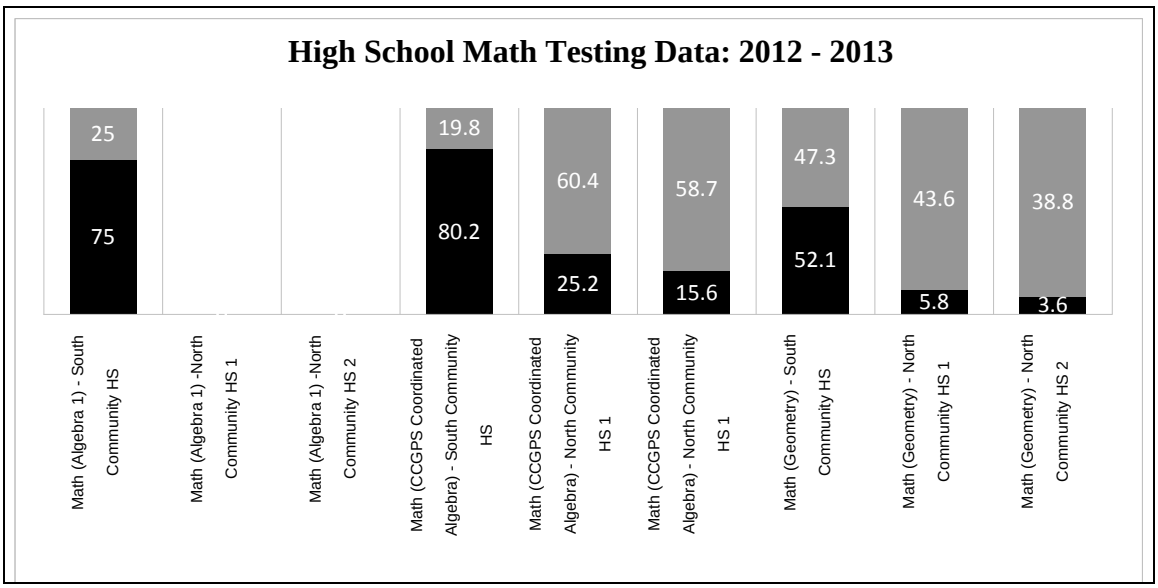


Figure 1. Comparison of Polaris and Octantis communities' student achievement in high school math.

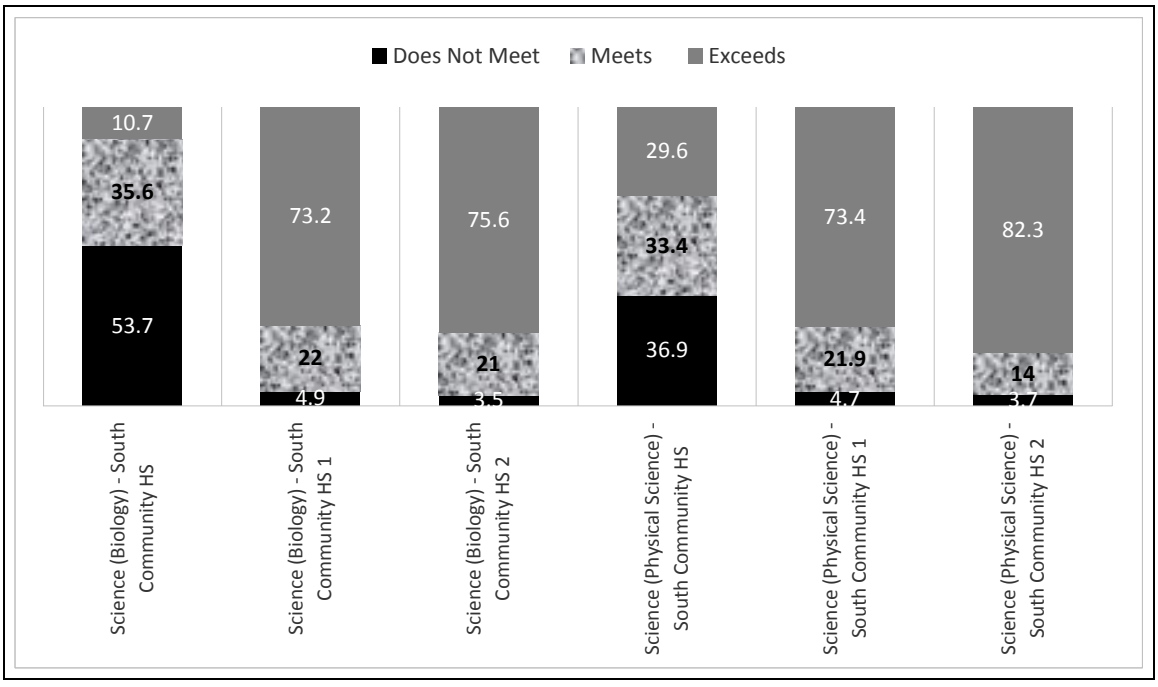


Figure 2. Comparison of Polaris and Octantis communities' student achievement in high school.

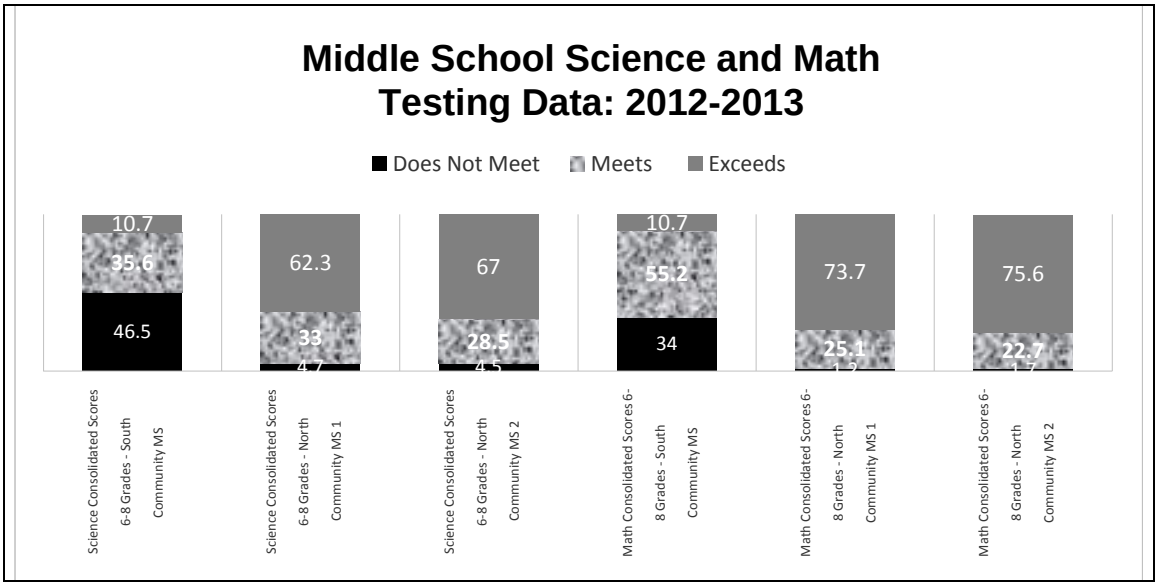


Figure 3. Comparison of Polaris and Octantis communities' middle school student achievement in math.

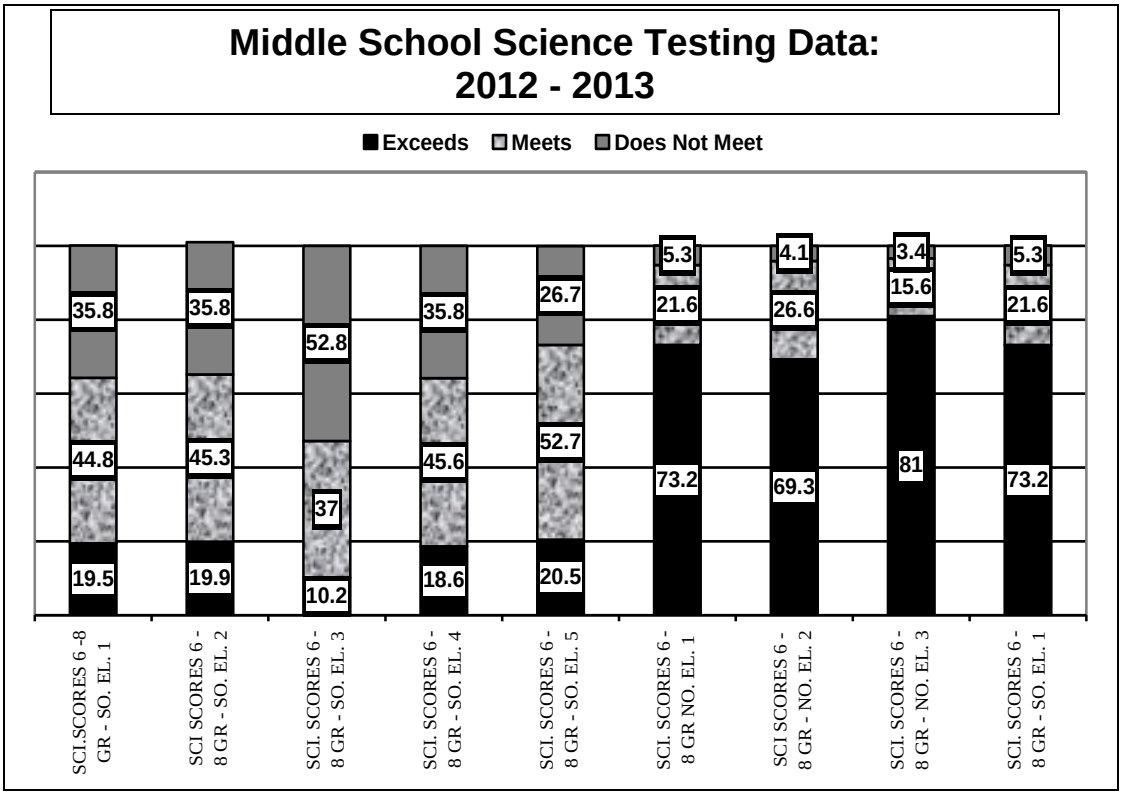


Figure 4. Comparison between Polaris and Octantis communities' elementary students.

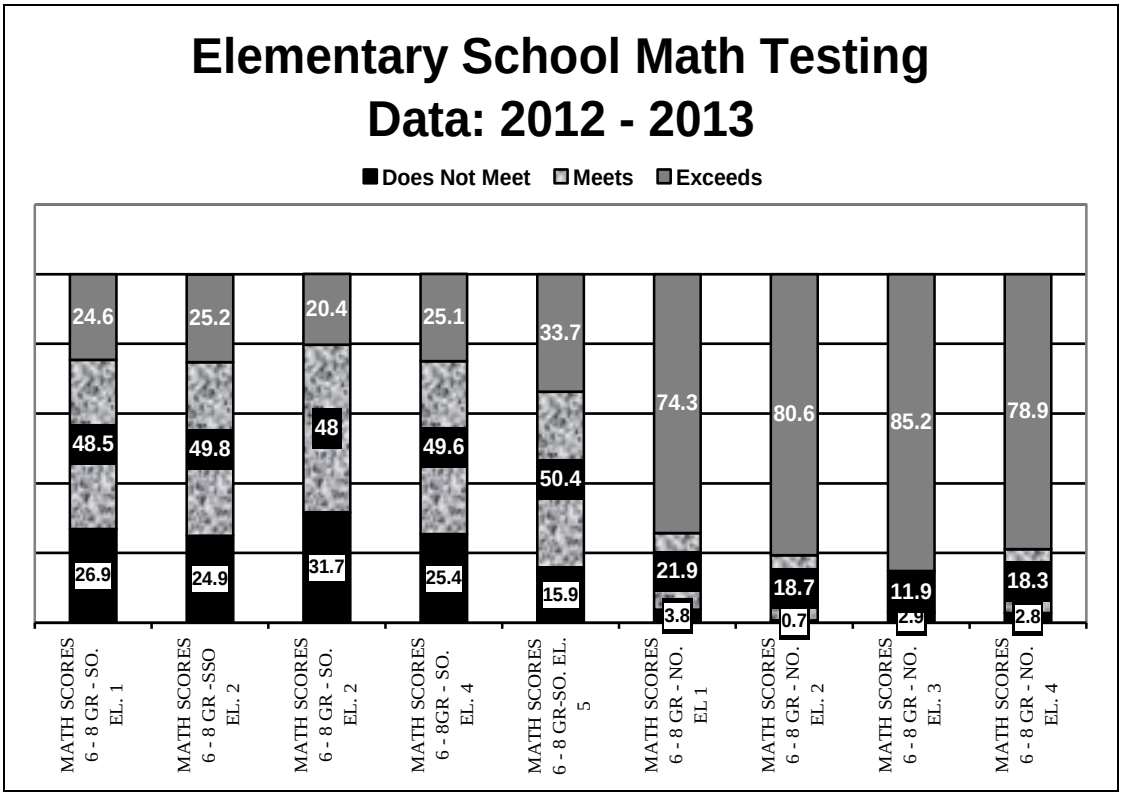


Figure 5. Comparison of Polaris and Octantis communities' elementary students in math.

Since all schools across the state have the same academic expectations based on state standards functioning as the driver for content and skills taught to students in mathematics and science; teacher qualifications for state certification attainment are the same; and funding is allocated to each school based on metrics stratifying students by program. For example, students enrolled within gifted or special education programs will be allotted more funding for their instruction than their peers who are not participating within these programs. The funding formula established in 1985 by the State Legislature, Quality Basic Education (QBE) draws funding from the state and the local districts, which must at minimum levy five mills, to establish what they deem an equitable funding structure. If parity in funding to support students' instructional programs and teacher

certification criteria are the same, then determining inputs contribute to the differing achievement rates exhibited by students within the same district may lead to substantive data driven decision-making on part of site based administrators at each school setting.

Although data driven instruction, as a means to address the academic divide, has propelled decision-making impacting instruction within classrooms over several decades, student achievement across all demographics has not experienced positive significant results. Other avenues of reform to address academic gaps have included the emergence of increased parental choice, including the increased establishment of charter schools. The total number of charter schools increased 43% from 217 to 310 schools – including system charter schools (GaDOE, 2014). These schools, often targeted at lower socioeconomic communities, have meted out (uneven) results. In many cases, charter schools have not proven to adequately close the academic divide between affluent and impoverished communities. So, if policies for instruction, staffing credentials and training and funding sources from the state are equitable, then determining which factors contribute to the differences in achievement between communities of differing socioeconomic status can lead to the development of a cogent school-home-community engagement model. Epstein (2002) asserted that an overlapping influence exists can bridge the home-school-community ecosystem. Parental engagement within schools and during students' out of school time opportunities are significant factors impacting student achievement. Academic support outside of the traditional school day has been a documented means to shore up academic gaps to those students needing to catch up and to enhance the pre-existing developmental assets of those on and exceeding achievement

targets. Creating equitable STEM academic opportunities that are both accessible and which exhibit parity in quality hinges of parents ability to demand resources and involve their children in these opportunities.

Purpose of the Study

The purpose of this mixed methods comparative case study is to investigate the extent parental social capital impacts student achievement in the core areas of STEM, science and math. Mixed method designs are those which "include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of method is inherently linked to any particular inquiry paradigm" (Greene, 1989, p. 256). Student achievement data will be collected from two sources; empirical data provided by the state of Georgia's Department of Education for overall school averages and self-reported data collected from surveys completed by parents with children attending schools within the study's two settings; the first setting is referred to as the "Polaris Community" and the other is referred to as the "Octantis Community." The data were analyzed to establish outcomes from two areas within one large suburban district within the state. Compared to state averages, data reflect that the average student's achievement data for students in the Polaris Community, an affluent area, is high and that of the Octantis Community, an economically disadvantaged area, is low. This study, which includes a participatory research framework, explored the social capital that existed within each setting to determine how parents employ community mobilization strategies to identify and inform their community of pre-existing resources to expand access to STEM learning opportunities,

and as a result, raise achievement in the STEM core areas of mathematics and science. Through this study, members within the STEM community will glean how to develop programming that addresses students' academic developmental needs based on grade level content and instructional strategies which reflect alignment with higher order thinking. This study will benefit educational leaders by providing insight into how parents and community stakeholders can work collaboratively to attract resources to further achievement in STEM. Implications for parents and providers of academic amenities include becoming more knowledgeable about how to bridge their relationships to recruit students or participation in out-of-school time educational programming occurring fidelity between instruction imparted by providers with the academic standards and the strategies which deepen critical thinking skills. The latter will also be afforded guidance into how to effectively incorporate pertinent academic standards and instructional strategies into their program.

Background of the Problem

Social capital as defined by Lin (2001) is access to and use of resources embedded in social networks. More often than not, the fluidity of which groups function is informal and created as a culture based on the unspoken norms developed overtime by members of communities hinged on how they interact with one another. Social capital differs from community to community and as time progresses and new members of the group are admitted, social capital can change. The manner in which groups wield their social capital is also based on unspoken norms. How ideals are shaped, community goals are organized and plans are executed is contingent on the culture established through the

social capital each community possess. The shaping of ideals begins first with the expectations of individuals who collectively band together to create a larger group perception of norms. These norms are transmitted through interactions between members of the group. How groups communicate, including the frequency and depth of information transmitted between members of their group can impact how the social group accomplishes goals benefitting their group. In a study of a neighborhood housing program, Lelieveldt (2004) found in his study, "Helping Citizens Help Themselves: Neighborhood Improvement Programs and the Impact of Social Networks, Trust, and Norms on Neighborhood-oriented Forms of Participation," that "social capital is an important stimulant of neighborhood-oriented forms of participation that include the prevention and tackling of problems" (p. 547). If social groups lack the capacity to intentionally use their inherent social capital, then community mobilization efforts can be employed to aid in their development of this power.

Parents within each school and community are distinct social groups. Although Parent Teacher Association (PTA) groups are the recognized formal social groups, parents also act and interact outside of this official grouping. Parental involvement actions and interactions which can be stratified into a series of levels, can be grouped to assist with understanding the varied acts parents exhibit to contribute to their child's academic and social maturation in school. Researcher Laura Desimone (1999) explored the dynamic between parental involvement, encompassed within a framework of 'actions, beliefs and attitudes,' and student achievement within the context of race and class.

Parents as agents of change for students' academic achievement possess varying abilities based on their social capital to empower their children and local schools.

Statement of the Problem

Schools cannot raise student achievement alone; they each need the support of their stakeholders, including parents and business partners. Financial and time constraints require schools to prioritize programming opportunities, which limit the time on task students have available to develop within STEM studies, including math and science. By extending opportunities for students to experience learning in these core areas, outside of the school day, the learning standards teachers seek to impart within their classrooms can be addressed and reinforced to raise student achievement levels.

Students with higher socioeconomic levels experience higher achievement in science and math. In the study, "Does the SES of the School Matter? An Examination of Socioeconomic Status and Student Achievement Using PISA 2003," researchers noted that lower-socioeconomic students had lower performance in math and science on the PISA than their higher SES peers. "In math…the difference between the typical low-SES student and the typical high-SES student, both in mid-SES school groupings, is 71 points, and for science, it is 80 points, or about 0.80 standard deviations" (Perry & McConney, 2010, p. 1152). Communities with deeper wells of social capital create additional learning opportunities outside of school which impact the achievement within school. By mobilizing parent stakeholders to galvanize existing academic amenities within their communities, student achievement for all students, whether economically disadvantaged or not, can be raised.

Significance of the Study

This study will enable educational leaders to support the development of stronger parental engagement to lead to improved student achievement by highlighting factors which impede and encourage stakeholder involvement. The participatory treatment will provide insight into the structural strengths and barriers which exist in affluent and economically disadvantaged communities; including, two-way communication between home and school and resource supports to establish and implement a parent-led school-home-community initiative. Drawing from collected data, schools will be positioned to gauge the quality of instruction of potential academic amenity providers to determine whether alignment of the curriculum standards exists between the in-school classroom experience and that of the academic amenity providers who support student development through tutoring, workshops, and classes. Additionally, stakeholders will have insight into the strategies used to engage students in activities led by academic amenity providers which lead to enhanced problem solving and critical thinking abilities.

Research Questions

RQ1: How does access to academic amenities impact student achievement?

RQ2: How does the quality of instruction within academic amenity opportunities impact student achievement?

RQ3: How does parent involvement impact student achievement?

RQ4: How does community cohesiveness impact student achievement?

RQ5: How does parental background impact student achievement?

RQ6: How do community values and expectations impact student achievement?

RQ7: How does racial identity impact student achievement?

RQ8: How does socioeconomic status impact student achievement?

RQ9: How does student extracurricular participation impact student achievement?

RQ10: How does community finance acquisition impact student achievement?

RQ11: How is parent involvement fostered to implement academic programming to impact student achievement?

RQ12: How is access and quality of academic amenity resources cultivated to impact student achievement?

Summary

The factors contributing to the heterogeneous make up of American schools creates both opportunities and challenges. To reach and teach children with disparate backgrounds, values, community norms, developmental assets and socioeconomic levels support is needed within the community on behalf of the schools. Affluent communities have differing social capital than their less affluent counterparts. This social capital, a network developed between group members connecting pre-existing resources from academic amenity providers to local schools, enables stakeholders to attract additional funding and human capital resources for their schools.

CHAPTER II

REVIEW OF THE RESEARCH LITERATURE

Organization of the Review

The jazz artist Charles Mingus is credited with saying, "Making the simple complicated is commonplace; making the complicated simple, simply simple, that's creativity" (Rogers, 2006, p. 2262). Tackling the pervasive issue of academic achievement gaps within STEM core subjects occurring within subsets of the nation's population requires artful reflection and innovative approaches. Research pertaining to the achievement gap between socioeconomically stratified groups of the nation's youth is robust. "The students who are falling behind come from predominantly high-poverty and high-minority areas" (Balfanz, 2006, p. 143).

Pinpointing how unfolding patterns of differing assets and behaviors exist within different populations impact student achievement in STEM has not been extensively researched through participatory research. As such, the researcher has categorized the critical components related to the purpose of this research into two core dimensions: out-of-school-time participation and parental engagement. To understand the scope of the problem, how out of school learning impacts student achievement in STEM and the role parents can play in increasing these opportunities through honing their social capacity, a series of topics must be explored, including **Out-Of-School Time Learning** to investigate what learning opportunities children engage in when not in school;

Instruction to Increase Critical Thinking to explore which instructional practices most effectively lead to student achievement; and **Parental Involvement and Social Capital** to explore how the broader development of community interaction is developed and of impact within the dimension of parental roles in the school community. Collectively, this literature exploration should enable the researcher to design a methodology to increase learning opportunities for students by bridging the home and school connection for increased engagement in STEM studies (see Figure 6).

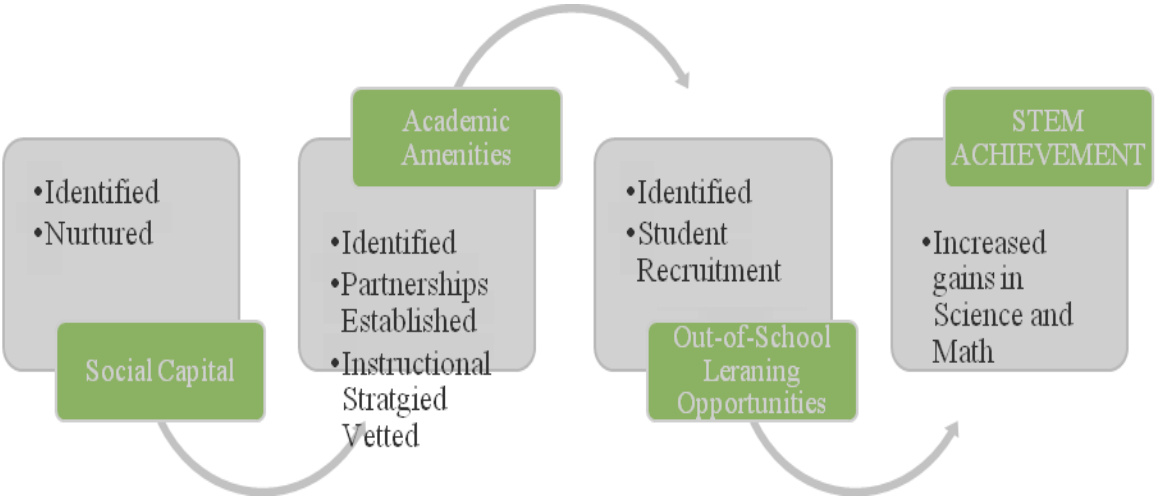


Figure 6. Bridging social capital and STEM achievement.

Emergent Themes

Out-of-School Time Learning and Academic Amenities

The Center for Research on Evaluation, Standards, and Student Testing (CRESST) conducted a study to ascertain how afterschool activities impact student outcomes in achievement, engagement and perceptions of their life chances by analyzing data from a longitudinal study sponsored by the National Center for Education Statistics. Results of the study showed that involvement in structured activities were positive across each of the dependent variables, including participation in clubs and social groups and math and science test achievement. Upon visiting 53 programs across the nation over a span of 3 years, a team of researchers lead by Denise Huang for the national CRESST, analyzed the instructional design, staffing, and parental involvement of afterschool sites providing instruction in five core academic content areas, including math, science and technology, along with homework support. Each of the participating programs were multi-site locations with extensive staff and participants to ensure the study netted a broad sampling of respondents for the study. Through this research, the quality of instruction across ten indicators was used for analysis, including:

1. Clear goals were established and strong leadership was evident
2. Program structures and content were aligned to meet goals
3. Schedules were established for youth to practice skills
4. Relationships were established to link afterschool activities to school-day activities
5. Curriculum linked to standards

6. Research-based teaching strategies were employed
7. Evaluations were conducted to check program effectiveness
8. Low turn-over of staff members
9. Staff members established positive relationships with students
10. Youth were engaged and kept motivated by staff members who set high expectations and established a rapport with their students. (Huang et al., 2010, p. 67)

Among the findings, the researcher concluded that varying activities throughout daily sessions and connecting learning activities to topics deemed relevant to learners, bolstered student engagement. A key practice across the nearly five dozen programs was the concerted effort to ensure fidelity of activities to individual program goals. Most of the study's participants developed their own curriculum instead of opting to secure pre-existing curriculum. Although most of the participants reported that the curriculum designed was at least partly aligned with state standards, the standards selected were often those of lower than higher grade levels.

A 2004 study commissioned by the Wallace Foundation, "All Work and No Play: Listening to What Kids and Parents Want from Out-of-School-Time," found that although younger learners have innumerous out-of-school-time (OST) activities, which may singularly include or be a combination of academic, sports or art, available at their fingertips, their teen counterparts do not and across all age groups, over 40% of respondents, which included two national random sample surveys with 609 middle and high school students and 1,003 parents of school-age children, felt that there were choices

then as desired during the summer months. Almost 4 in 10 expressed concern that their children would "fall behind on academics – a factor that perhaps contributes to the substantial number of students (56%) who would be interested in a summer program to help them keep up with schoolwork" (Duffett, Johnson, Farkas, Kung, & Ott, 2004, p. 23). Furthermore, "low-income and minority families are significantly less likely to be satisfied with their options" (p. 24). Only 23% of low-income parents had a scheduled place to go and activities to do afterschool for their children as opposed to their higher-income peers who reported at a rate nearly double (44%) that these opportunities existed for their families; with a narrower margin, white parents (39%) outpaced their minority counterparts (34%). The gap between this routine being ideal and actual was minimal for white parents with 40% reporting this OST activity as ideal and 39% as actual. Minority parents had a much wider gap with 56% responding that this OST activity would be ideal but only actually being experienced by 34%. Similar patterns exist between higher-income (45% report ideal while 44% report actual) versus low-income parents (41% report ideal while 25% report actual) (Duffett et al., 2004). The respondents also had disparities between their experience securing activities and programs that are of high quality. Low-income parents (45%) and minority parents (37%) had less ease in finding high quality programs then their higher-income (66%) and white counterparts (66%). The study found that white and higher-income parents had an overwhelming edge at securing desirable OST activities and programs for their children then minority and low-income parents that were affordable (62% and 65% to 39% to 30%) conveniently located (71%

and 72% to 44% and 45%) and interesting to their children (71% and 74% to 53% and 49%) (Duffett et al., 2004, p. 26).

A 2012 qualitative ethnographic study of a community-based after-school program explored how tutoring and mentoring impacted the academic performance and social development of low-income urban students who met four times weekly with college-age tutors. The setting of the study, a Texas high school with a weekly math-focused after-school program which catered to multiple sites at other area schools, provided the researcher insight into the perceptions of the tutors who rendered services. Through observation and extensive interviews, the researcher unveiled the methods and meaningful insights into how OST can impact urban learners who are provided the support of additional academic amenities in a core STEM-based discipline. The main protocols for the academic portion of each session include opportunities for each member of each small group to share the graded work they received back from their classroom math teacher, as well as homework assistance and reinforcement of how to solve problems the students will encounter on the state assessment. The latter portion entails the eating of a meal in a casual, family-style manner to allow the tutors and their small groups an opportunity to converse about academics, college life and life in general. To keep abreast of the material being introduced in classroom during the day and to keep the afterschool pacing in alignment with what the students are learning from their math teachers, the tutors attend the school's math departmental meetings, use state assessment preparation workbooks supplied by the school to each students and avoid veering to far from material being taught in class. (Long, 2012, p. 60). Although this program was not

one of the 53 participating in the aforementioned study, it is evident that it is effective by evidence of several indicators including, links between afterschool activities and school-day activities and afterschool materials aligned with state standards. The interviews revealed that the tutors would motivate students with a smattering, including providing candy as an award system to award positive outcomes.

The program, which included students from all grade levels at the school, saw marked deficiencies in members of the freshmen class who matriculated to the high school with learning gaps. On the opposite side of the spectrum, twelfth graders were reported as having less than stellar performance that was attributed to their status as seniors (Long, 2012, p. 95).

Methodology was left up to the discretion of each tutor and could include an instructor led modeling of how to solve a problem, independent solving of a problem followed by a review of each small group member's steps or other method as deemed suitable by the tutors. Although many of the CRESST cited indicators were observed, including opportunities for daily program evaluation and opportunities for skill development, resources were limited and often did not include the benefit of functioning technology or materials outside of a portable whiteboard, paper, workbooks and writing utensils. The researcher found that although this limitation existed, the tutors effectively aided their students' self-efficacy by showing interest in their group members (Long, 2012, p. 136). The impact of forging a relationship in an academic OST setting between students and their instructors is the yielding of positive academic benefits to students.

The impact of family composition on academic achievement and college scholarship attainment was researched by Barry Nagle (2013) who constructed a secondary analysis study to explore the extent of the relationship between single-parent household status of African American children was correlated to OST participation as a variable on standardized test score achievement. The researcher cites data the Annie E. Casey Foundation indicating that the vast majority of African American children (60%) are being raised in single parent homes. The sample for the study included high achieving, as determined by their average high school GPA and overall SAT score, African-American children of single parents that vied for a national competitive college scholarship based on part of their Pell grant eligibility. The researcher, who developed a scatter plot to investigate the relationship between OST participation and the dependent variable, student test scores, found a positive relationship between the two. Notably, when gender data were disaggregated, "for every one hour increase in male OST participation, standardized test scores increase 0.148 [while] female OST participation increases resulted in an increase of 0.174" (Nagle, 2013, p. 168).

The study extrapolated data from the U.S. Census Bureau for OST Participation Independent Variable to include extracurricular activity participation, organized activities which occur outside of the school day, by race for children age 12 to 17 in three categories: sports, clubs and lessons. Clubs include participation in Boy Scouts and Girl Scouts, along with 4-H activities and the Girls and Boys Clubs, while the lessons category included after-school and weekend work by subject and included religion, arts, language and computer activities. Nagle's (2013) findings, which echo findings from

Child Trends, include that white children participated more frequently in OST than their African American peers (Theokas & Bloch, 2006). The rate of participation for white children is .9 percentile points above the national average and African-American children is 3.2 percentile points below the national average.

Parental Involvement and Social Capital

Researcher Joyce Epstein (Epstein & Sanders, 2002) crafted a typology to stratify the varying levels of parental involvement. In doing so, the actions of parents were matched to predicted outcomes as illustrated in Figure 7.

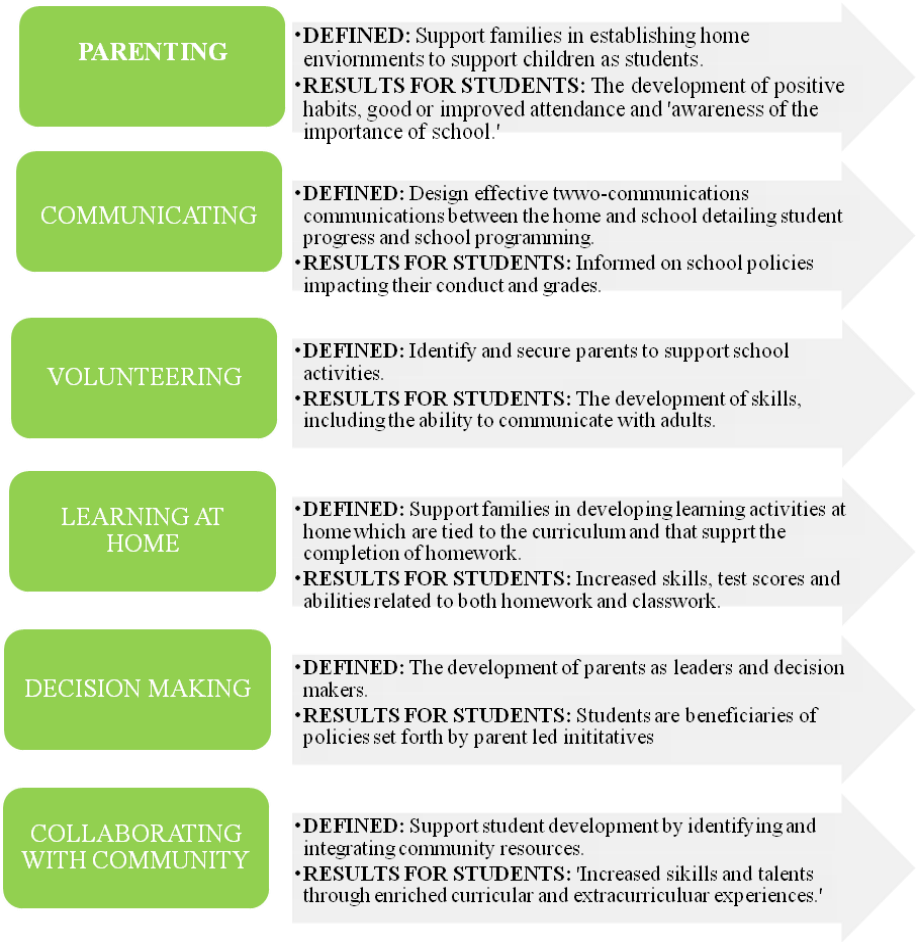


Figure 7. Joyce Epstein's framework of six types of involvement.

Within an ethnographic study conducted in 2002 comparing the parenting behaviors of two racial groups, researcher Annette Lareau (2002) noted,

> Middle-class parents engage in concerted cultivation by attempting to foster children's talents through organized leisure activities and extensive reasoning. Working-class and poor parents engage in the accomplishment of natural growth, providing the conditions under which children can grow but leaving leisure activities to children themselves. (p. 747)

Through a three-prong methodology, which included site observations at school, parental interviews spanning over an hour per respondent and home visits, the researcher was able to detail how two distinct classes of families interacted with their children as it pertained to the development of their children. Based on data extrapolated during their research, Lareau's team discovered patterns which led to the conclusion that middle class families identify their children's talents and nurture their children's growth intentionally by involving in activities to cultivate their talents. Conversely, poor families provide for their child's physical needs and do not intentionally cultivate their children's talents. In the study, the researcher noted that the middle-class parents expended a notable amount of time and money related to their children's activities. In one cited example, one middle-class parent spent time nightly coaching their academically struggling child step-by-step through assignments. This study provides insight on how families across differing socioeconomic spectrums behave within the home setting and informs of the decision-making made on behalf of children attending schools in communities of varying affluence levels.

How parents interact within social networks differs based on class distinctions. Working class and poor families typically interact with one another based on kinship ties while middle class families form 'intergenerational closure' through network ties connecting parents of school peers (Horvat, Weininger, & Lareau, 2003, p. 327). The latter, therefore, have increased opportunities to transmit information related to their common entity, the school, and are therefore positioned to leverage these ties to participate readily in all six typology levels outlined in Epstein's framework. Patterns of behavior noted by Lareau (2002) within middle class families when attending or leading events at their children's school, included heightened noise levels as parents interacted with their peers since they had previously connected in similar settings in the past. Conversely, at the school setting in which families were working class and poor, families did not already have established relationships with their peers and subsequently spent limited time conversing with one another. When creating parent-led initiatives, the outcomes of the working class and poor families were less elaborate than those of their middle school peers. The researcher posits that these outcomes, heightened interactions and activity planning, demonstrate that the social capital of middle class families enable them to start readily at all of varying levels of Epstein's (2002) Framework.

Developing ties to other parents through their children's activities and routines is further impacted by the number of activities children engage in. The research of Horvat et al. (2003) noted that as income levels rose so did the number of activities their children participated in. Middle-class children participating within the study engaged in five activities while poor families engaged in two. "Given that children's activities are a

central pathway for the formation and maintenance of parental connections, these differences suggest that in at least one important arena, middle-class parents have greater opportunity to forge such connections" (Horvat et al., 2003, p. 328).

Instruction to Increase Critical Thinking and Achievement Outcomes

For the purpose of this study, quality of instruction is aligned with the complexity of assignments and activities against the hierarchy developed by Benjamin S. Bloom. Within Bloom's Taxonomy initially published in 1956, cognitive learning is laddered based on complexity starting with baseline activities of recall of information and comprehension to the apex of cognition – evaluation (Seddon, 1978, p. 307). As a measurement tool for learning, educators are enabled to use Bloom's Taxonomy to identify the level of cognitive development experienced by their learners across a spectrum of learning activities. With each successive level of the hierarchy, learners amass skills and understanding from the lower levels to amass a deeper and enriched cognitively demanding capacity. In practice, the Revised Bloom's Taxonomy published in 2001 to modify the original work to fit the learning needed for the 21st century learner, would present activities related to a series of fairytales as presented in Figure 8.

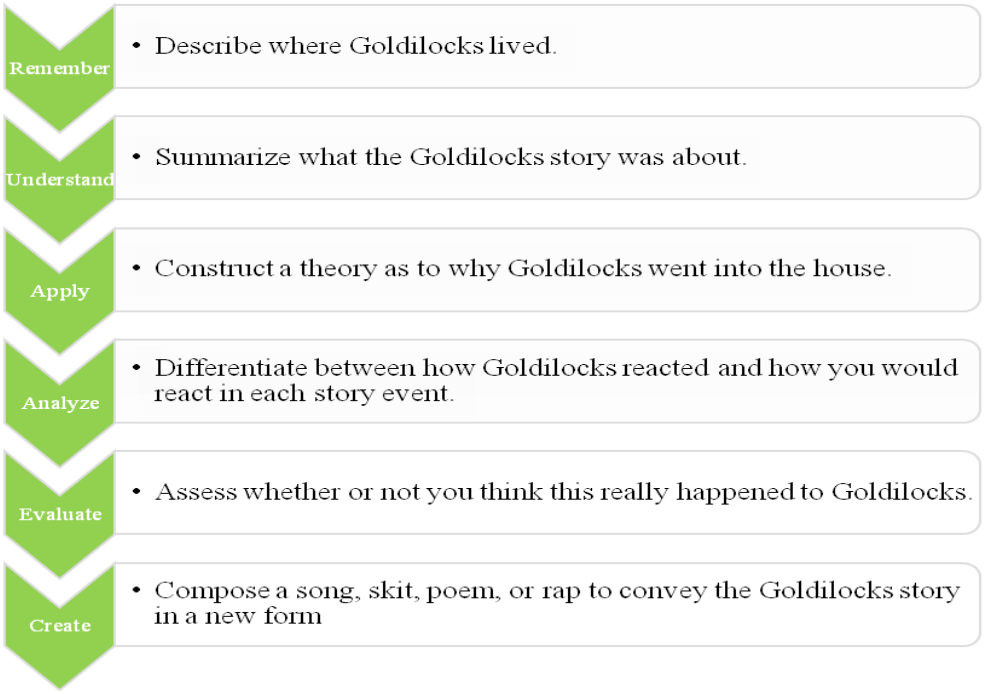


Figure 8. Using the revised taxonomy in an adaptation from the Omaha public schools.

Although "demographic factors such as socioeconomic status (SES) and ethnicity are associated with achievement outcomes" (Hill et al., 2004, p. 3), pedagogy is most attributable to student achievement gains; dichotomous methods are used to raise critical thinking skills, those embedded skills taught through other content or explicit instruction to teach specific critical thinking skills (Marin & Halpern, 2011, p. 1). Critical thinking, coined by John Dewy as reflective thought, involves analysis of information to synthesize facts into a whole after judging discrete facts (Sanders, 2008, p. 40). Critical thinking can also be defined as a process of problem-solving or one that applies deductive logic (Grauerholz & Bouma-Holtrip, 2003, p. 486). Bloom's Taxonomy enables learners to apply the process of critical thinking by delving into activities which prompt the learner to analyze information for the intent of constructing solutions or deconstructing

problems. Case method instruction, which involve using large and small group discussion and modeling to increase student accountability and more activities during the learning process (Fasko, 2003, p. 3).

Social Media Adoption of New Technologies and Social Capital Bridging

Citing studies from researchers Icek Ajzen and Martin Fishbein, including The Theory of Planned Behavior, a team of investigators led by June Lu (Lu, Yao, & Yu, (2005) explored how the behavioral sciences impacted the adoption of technology. Two companion theories, The Theory of Reasoned Action (TRA) and Theory of Planned Behaviors (TPB), illuminate how internal drivers, behavioral perceptions of performing specific behaviors and external motivators, normative beliefs regarding social pressures to perform or not perform the behavior in question influence the technology acceptance model (TAM). Lu's team surmises that a "direct association between changes in beliefs and changes in intentions and outcome expectancies" exists (Lu et al., 2005, p. 247). TAM assists in exploring how individuals engage in adopting technology based on independent choices within the context of social pressures. Lu's study proposed to investigate "whether internalization of social influences and personal tendency to try affect potential users' intention to adopt wireless Internet services via technology (WIMT) (Lu et al., 2005, p. 247).

This study proves useful in gauging how stakeholders' perceptions to use communication services, including text messages and social media, are spurred by internal and external motivators. Through this study, stakeholders were asked to what extent they engage in communication services and how, if at all, they employ this usage

to connect to their social network connected to their local school community. Some of the questions within the instruments served to gauge whether their usage of social media, and other forms of communication services, are stunted by their lack of adoption of current technological innovations, as well as whether their extent of usage includes other social networks but not that of their local school's community. Through their examination, which included a questionnaire with five indicators in social influences, Lu's team uncovered that individual's perceptions towards WIMT's usefulness and ease of use were attributable to social influences from social networks (Lu et al., 2005). Therefore, the people within each stakeholder's sphere can be an influencer on the adoption and continued use of social media and other communicative services used to engage in the development of dialogical relationships between social network members.

As outlets for disseminating information about opportunities for students' academic growth and the role each stakeholder can play to assure these opportunities are presented to students and their families, the World Wide Web (WWW) can pose to be a vehicle to develop dialogic relationships between the home, community and school. Kent and Taylor (1998) examined how relationships can be developed by an organization. They state, "Using technology does not have to create distance between an organization and its public. Instead, Internet communication can include a 'personal touch' that makes public relationships effective" (p. 323). They further elucidate that a theoretical framework to strategically facilitate relationship building within a web-based environment can be based on one of four public relations models from Grunig and Hunt (cited in Kent & Taylor, 1998):

> The two-way symmetrical model which is a process established by an organization to set up both systems and rules. Thereafter dialogues can ensue. Dialogue, as the basis for relationship building, requires that there is a level of trust and openness between both parties. As a medium for establishing and developing relationships between members of a social network, the WWW is a 'convivial tool' which is impacted by the desires and inclinations of the users and an extension of the user. (p. 324)

The ability of a web-based environment to create a dialogical loop that constructs a continuous back and forth communication channel between the organization and its public removes the lowest level of engagement, one-way information sharing, to the development of a higher degree of relationship continuity—shared decision-making and shared engagement. Dialogical loops require that organizations monitor their websites to ensure that they are not merely a "presence" online but that they providing "service, access, and content" (Kent & Taylor, 1998, p. 327). The implications for a home-school-community network is that each part of the triad has all applicable skill sets to navigate online environments and the willingness to monitor and respond to communications between each part of the network.

The ubiquitous Smartphone has increased the presence of mobile users and the development of mobile applications. School based tools include social media platforms such as Twitter and Facebook, along with emails, test messaging and apps specifically created for communication between entities such as schools and their networks, such Remind and Volunteer Spot. The former is a tool to connect classroom teachers and their

students' families through messaging. The latter enables organizations to sign-up stakeholders for volunteer opportunities to assist in school initiatives. Media Richness theory (MRT) ranks medium based on four components including feedback, capacity for multiple cues, ease in employing natural language and ease in personalizing a message. Emails rank low in richness due to the potential for slow feedback and the inability to employ nonverbal cuing (Thompson, 2011). In spite of this, parents tend to use emails, a lean medium, with more frequency that face-to-face communications for lower complexity tasks—checking grades, as well as, more complex activities—checking behavior due to convenience.

In a mixed-methods study authored by Thompson, Mazer, and Flood Grady (2015) that included a 16-item multidimensional measure rating frequency of communication, "Development of the parental academic support scale: Frequency, importance, and modes of transportation" (p. 190), it was found quantitatively that parents opted to engage using the leaner mode of email communication while qualitatively it was discovered that "parents placed importance for selecting richer media for complex topics [and] valued the cues associated with richer media" (p. 190). The three reasons attributed to parents opting to using email as a communication tool with school stakeholders include convenience, the ability to read and respond within their own timetable and the ease and quickness of email communication (Thompson, Mazer, & Flood Grady, 2015).

During the qualitative portion of the study, tools not mentioned in the quantitative instrument revealed additional tools parents were interested in employing to connect to

the school environment, including Skype and Instagram, which allow for nonverbal cuing available in richer media, and Facebook, which offers immediate feedback through its instant messaging feature (Thompson, Mazer, & Flood Grady, 2015). However, some parents responded that they would opt out of using Skype as a means of communication because they were not comfortable with the platform. This harkens back to both Kent's research which prompted the need for members of the dialogic loop to be versed in the technology and Lu's that revealed that ease of use is a factor in the adoption of a technology. As a means for increasing the use of richer technology mediums, such as Skype which offers asynchronous communication through video messaging which can be recorded by one party and watched as a later time by the receiving party of the video message, the social network can provide support to its members by encouraging use and providing training of the medium.

Surveys distributed to 204 parents in a mixed methods study involving parent respondents of students in grades 4 to 6 investigated the extent "teacher communication through the use of technology promote parent involvement in their children's academic lives" (Olmstead, 2013, p. 31). The parent respondents were asked about their use of technology including their use of cell phones, email, social networking and the frequency of in which they accessed school and teacher websites. Over half of the 89 respondents used email to communicate with the teacher and, 96.6%, had a cell phone. Two of every three parents used the social media platform Facebook and 46% of "parents checked the school's website and their teacher's website 1-2 times per month" (Olmstead, 2013,

p. 33). Interviews conducted with teachers revealed similar conflicting results as the aforementioned study conducted by Thompson (2011). Although the respondents preferred email and social networking, they employed email and FTF. Further studies may assist in understanding why behavioral attitudes and actions are incongruent. Olmstead's (2013) study also revealed that although none of the teacher respondents, most with over 10 years of teaching experience, had previously opted to use instant messaging, Facebook or Twitter to communicate with parents, that 85.7% were willing to do so. To sustain a dialogical loop, all parties must be willing to engage in two-way communication. Olmstead's study reveals that although social network members may be willing to engage in social media communication their present actions reveal that adopting this as a medium of communication is possibly stunted by one or both parties lack of adoption of the use of the technology.

Schools are not alone in their usage of communication services to build relationships with their public. A qualitative study consisting of interviews with 40 members of the American Red Cross included responses such as, *don't just issue a press release, try to have a conversation*. There was an overall sentiment that a two-way communication can illicit from the public areas in which the organization can improve and the means of communication, Facebook and Twitter, yield more responses. The former is noted by respondents as a means to "spread awareness" while the latter aids in developing brand power because the simple interface allows for sharing one point at a time (Briones, Kuch, Liu, & Jin, 2011, p. 39). One cited barrier was the need to ensure that the dialogical loop is maintained with persons available to respond to the two-way

communication available through social media platforms. Additionally, it was believed by the respondents that board chapter leaders, who served as gate keepers, were of an older generation and less apt to be familiar with the platforms and less likely to approve their adoptions (Briones et al., 2011). This may echo Olmstead's (2013) research which revealed that all of the teachers participating in the study were veterans with over ten years of experience in the classroom and had not previously sought to employ social media technology.

The social capital implications of social media communication as a medium to engage a dialogical loop between the school-home-community social network has been studied by Burke, Kraut, and Marlow (2011) who stated, "Social network sites (SNS) are designed to connect people with friends, family, and other stronger ties, as well as to efficiently keep in touch with a larger set of acquaintances and new ties" (p. 1). Strong ties, such as those between family members and good friends, can be bonded together for support and companionship while weaker ties, such as those between people who negotiate their relationship in different social spheres, can be bridged together for the purpose of information sharing. Heavier users of the Internet develop higher degrees of social integration since online communication and participation in social networking influences one's social capital. Based on Gilbert and Karahalios' (2009) "The Strength of Weak Ties," strong and weak ties can also be defined as follows:

> Strong ties are the people you really trust, people whose social circles tightly overlap with your own…Weak ties, conversely, are merely acquaintances. Weak

> ties provide access to novel information, information not circulating in the closely knit network of strong ties. (p. 212)

In a study of 35 college students, it was concluded that social media can predict tie strength and that the tie strength of dimension of intensity is impacted by continuous interaction between Facebook friends (Gilbert & Karahalios, 2009, pp. 2, 8). As a medium for bonding and bridging, social capital is cemented through social media usage for offline relationships (Burke, Kraut, & Marlow, 2011). For the purpose of this study, the research of Burke et al. aids in developing the methodology to use social media tools as an additional, but not sole, medium to connect social network members engaging in the treatment.

STEM Achievement

The study narrows its academic focus to the STEM fields due to the current development of STEM programming in and outside of the school environment. Although mathematics has always been a traditional indicator of student success along with reading on high stakes assessments and evaluations such as the SAT, for individual students, and NCLB, which tracked schools' and their districts success based on aggregate empirical student achievement data, science has become an increasingly monitored area of academic growth for students.

STEM education encompasses an array of subjects including computing, career and technical classes, engineering, science and mathematics. Since the latter two are core subjects within the P12 setting, for the purpose of this study, these subjects of primary focus. However, it is important to note how some districts are employing integrative

STEM education, which is a constructivist practice in education, to develop their educators to collaborate across disciplines to address the number of students, especially those from historically underrepresented populations, who have lost motivation in both math and science (Sanders, 2008). This approach to teaching and learning in STEM is critical as a means of seeing how home-school-community stakeholders, including the science and mathematics classroom teachers and STEM academic amenity providers, can work in conjunction with each other across fields to support student achievement through shared training and shared projects. It is meaningful to the study to investigate how sustainable relationships can be developed through the implementation of a network which offers opportunities for educators in and outside of the classroom to become involved in professional development and collaborative projects.

As students matriculate from elementary to high school, their positive attitudes towards mathematics wane. Since attitudes can be associated with the overall decrease in intrinsic motivation, it is important to determine how attitudes towards academic content can impact students' subsequent achievement. Good achievers tend to experience positive attitudes towards math due to heightened intrinsic motivation resulting from mathematical tasks being met successfully while their low achieving counterparts have less frequent success with mathematical tasks and consequently develop a low self-belief in confidence and a negative attitude towards math. Teachers play a crucial role in igniting positive attitudes for mathematics by employing instructional practices which support students feeling competent and developing situations which are pleasurable and seen as self-determinate. By selecting meaningful tasks and establishing an instructional

environment that is supportive, teachers can serve as a catalyst for students developing intrinsic motivation.

Summary

Out-of-school learning opportunities, when accessible, can provide further contact for students in STEM studies. Essential components of effective afterschool academic programming include linking after school activities to school activities and alignment of curriculum materials to state standards. Involved parents should engage in one of six types of activities to bridge the home and school environments. Socioeconomic status is a factor in how families behave with their children and peers. Middle-class families structure their children's activities and often engage them in more out of school opportunities than working class and poor families. Due to peer relationships formed through the connections they make with other parents invited to participate in the same extracurricular activities, middle-class families tend to collaborate more with one another. Cultivating social ties through social media is made possible through dialogical looping in which both parties respond to the other through two-way communication. Through the use of Bloom's Taxonomy (Seddon 1978), instructional strategies can be designed to impart opportunities for higher order thinking, another key component of the effective afterschool instructional programming.

CHAPTER III

THEORETICAL FRAMEWORK

Theoretical Design

This study was designed to compare how social capital is used by communities with differing socioeconomic and student achievement levels to attract learning opportunities for their children's student achievement in STEM. The mixed-method research paradigm used for this study was selected because of its ability to capture a wide spectrum of data inputs and perspectives to glean insight into what social capital resources are available, how community members operationalize the use of their resources and networks in differing settings and how the quality of resources within socioeconomically opposing settings potentially differ in quality and quantity. As such, this study investigated factors which relate to social capital, including community cohesiveness, parents' backgrounds, availability of academic amenities and community values and expectations within the context of actors associated with students achievement and critical thinking—state Criterion-Referenced Competency Test (CRCT) scores, norm-referenced test scores, SAT scores for high school seniors and instructional practices to propel critical thinking as aligned to the top four tiers of Bloom's Taxonomy (Seddon, 1978). Bloom's Taxonomy stratifies learning based on a hierarchy of complexity beginning with recalling and comprehending knowledge. The latter four tiers

require that learners apply, analyze synthesize and evaluate learned knowledge for the intent of solving problems, extrapolating information components, using creativity to combine information and decision-making (see Figure 9). As learners ascend within the taxonomy's hierarchy, the complexity of questions pondered and tasked they are engaged in require more in-depth thought.

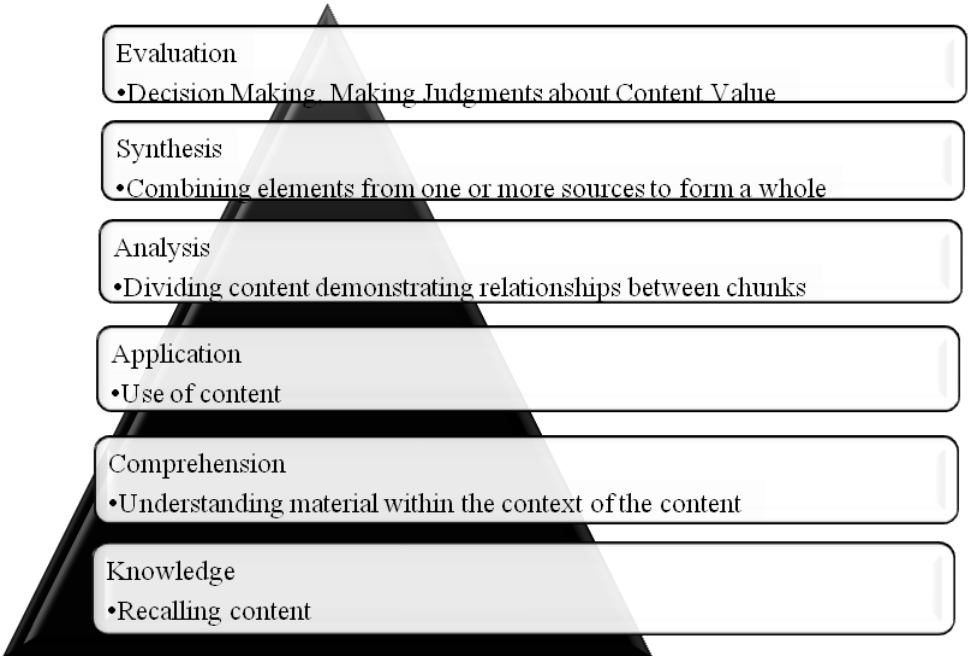


Figure 9. Bloom's Taxonomy.

Theory of Variables

Student achievement in mathematics and science and opportunities for students to think critically within these two subject areas are dependent on a series of factors, including access to academic amenities, the cultural background of parents, the socioeconomic status of families, student's participation in academic extracurricular activities, community cohesiveness, race, community values and expectations, parental

involvement and community financial acquisition. Figure 10 shows the relationship between the independent and dependent variables of the study.

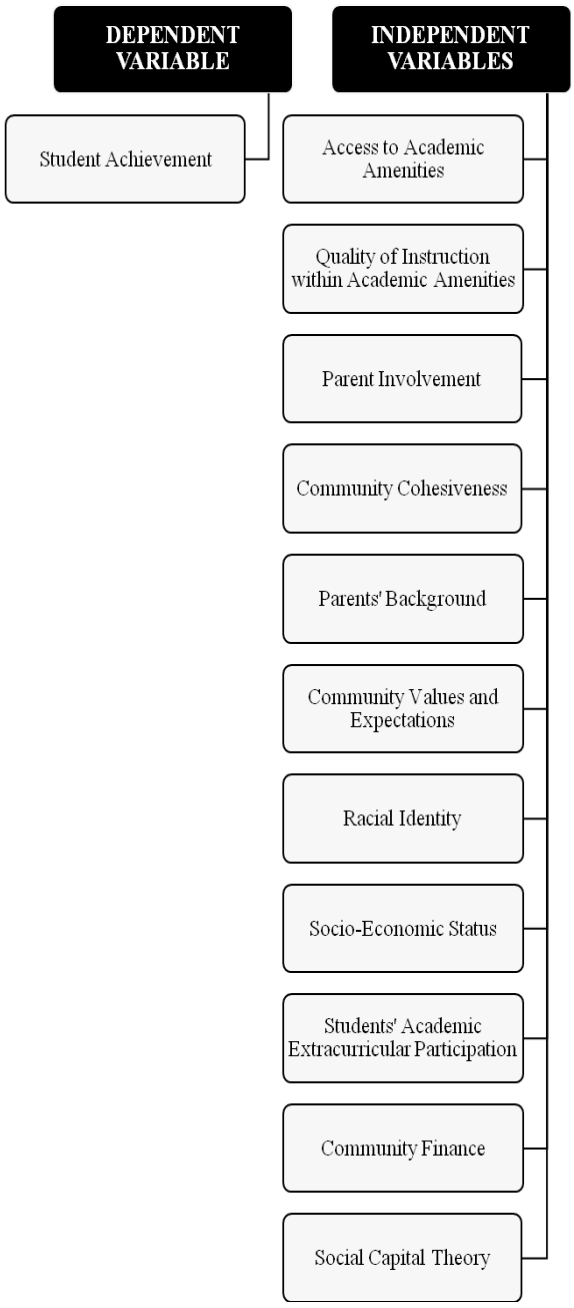


Figure 10. Relationship between independent and dependent variables.

Definition of Variables and Other Terms

Dependent Variables

Student Achievement: For qualitative analysis, this variable is defined as the empirical average score on the CRCT for students on the mathematics and science subtests, mathematics portion of the SAT completed by high school seniors and the results of third, fifth and eighth graders ITBS norm referenced test results. For quantitative analysis, this variable is the self-reported date collected by parents regarding their students being "Below," "On Level," or "Exceeding," in mathematics and science instruction occurring in class.

Independent Variables

Access to Academic Amenities: This variable is defined as academic learning opportunities aligned to curriculum standards offered by for-profit entities and non-profit organizations, including local libraries, accessible for participation to students within the community.

Community Cohesiveness: This variable is the extent to which members of the community are participants in activities that relate to the civic or school initiatives, and feel that members within the community feel connected to each other and the community's ideals and goals.

Community Finance: This variable is defined as the extent to which community members are knowledgeable of activities to secure resources for their community, including the establishment of foundations to support community development and securing county and municipal resources for the same.

Community Values and Expectations: This variable is the perception of how individual survey respondents deem attitudes, beliefs and actions of their community.

Instructional Quality of Academic Amenities: This variable is identified as instructional strategies and activities employed by educators within instructional settings that align with the top four tiers of Bloom's Taxonomy, a hierarchal stratification of six learning complexities from knowledge, comprehension, application, analysis, synthesis, and evaluation.

Parental Involvement: This variable is defined as the extent to which parents assist their children with homework, attend school functions, including parent-teacher conferences; and use resources to support their children's academic development.

Parent's Background: This variable is defined as the parents' educational attainment level and location of where educational attainment occurred.

Racial Identity: This variable is a self-reported demographic to include the following categories: African American, Asian, Hispanic, Native American, Caucasian, or Multiracial.

Social Capital Theory: This variable is defined by researcher Nan Lin (2001) as access to and use of resources embedded in social networks.

Socioeconomic Status (SES): This variable is defined as the household income of individual families or single parent homes and the median income average of a community.

Students' Academic Extracurricular Participation: This variable is the extent to which students are involved in learning activities outside of the school day which are

correlated to core subjects taught in school: mathematics, science language arts and social studies.

Relationship among Variables

This study examines the relationship between the independent variables and student achievement. The independent variables are stratified into two categories: Demographic Factors, racial identity, socioeconomic status, and parental background, and Social Capital Factors—academic amenities, student participation in extracurricular activities, parental involvement, community cohesiveness, community resource acquisition and community values, and expectations. The author posits that the demographic factors establish commonalities within each setting, each defined setting, based on their social capital factors shapes the actions of the social setting and that interaction leads to outcomes in student achievement. Previous studies, including the finding listed in the Coleman Report of 1966, have correlated the socioeconomic factors and student achievement. This study investigated how those factors are manipulated by members of the settings' community to engage their social networks to access resources that impact student achievement (see Figure 11).

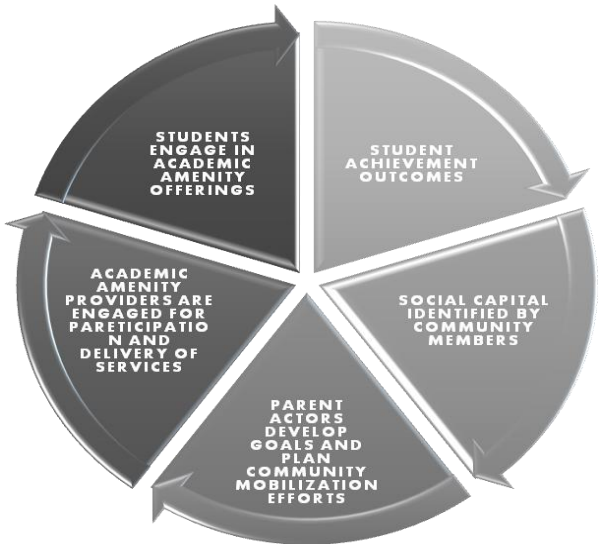


Figure 11. Social capital and community mobilization for student achievement.

Limitations of the Study

The limitations for this study are outlined as follows:

1. The researcher is a resident and parent of children enrolled within schools in one of the two settings.
2. Self-reported data, including socioeconomic factors and student achievement, may not be accurate.
3. The perceptions of participants may be incongruent with the broader community.

Summary

Within this chapter of the study, social capital theory was used to outline two sets of factors which act together to produce student achievement outcomes. Also within this chapter, independent and dependent variables were identified and defined, including those pertaining to Bloom's Taxonomy which was used as a fidelity tool during an

investigation of the quality of instruction imparted by academic amenity providers. This investigation also included a participatory action component which was conducted to ascertain how community members identify elements of their community resources and work in concert to ensure access to these resources were available to extend learning opportunities for children.

CHAPTER IV

RESEARCH METHODOLOGY

Research Design

This mixed-methods comparative case study was designed to investigate two distinct communities within one school district; one located in the Octantis end of the district, to be referred to as "Octantis Community" and the other located in the Polaris end of the district, to be referred to as "Polaris Community." The participating research study settings, Polaris Community and Octantis Community, were selected based on their vastly differing socioeconomic and student achievement levels. For this study, one middle school and two elementary schools were studied within each of the two settings focusing on grade levels which participate in the Iowa Test of Basic Skills® (ITBS): third, fifth, and eighth grades. The ITBS, a norm–referenced exam provides a snapshot of students' competencies in language arts, science, social science and math. The scores, reported as percentiles, are used as a criterion for participation within both gifted and special education program.

To identify the contributing factors impeding student achievement, document analysis of instructional standards and plans, student achievement data on state administered exams, interviews with members of school administration and a series of perception surveys to ascertain how stakeholders, including teachers, parents, and

community members, perceive the impact of parental involvement, access to academic amenities, the level of community cohesiveness involvement in extracurricular activities, and community values on student achievement. Surveys administered to parents and students captured data to illuminate how they perceived their role in schools and the community impacted the opportunities for learning students could access outside of the traditional school day. These surveys were administered online. Surveys administered to academic amenity providers, including tutoring services, community outreach members of museums, and STEM-based youth programs, included questions that focused on the strategies during instruction, frequency and time allotted per session for instruction, and standards addressed during instruction. Fifteen educators, 100 parents, and 6 STEM-based academic amenity providers within each of the Community settings were studied. Additionally, school administrators participated in brief interviews to engage in discussions about the measures taken in their individual schools to address STEM achievement gaps experienced among their students. Administrators also discussed (a) instructional strategies observed within their schools' classrooms which fostered critical thinking, (b) how business and parents were groomed to serve as leaders to support the schools' instructional goals, and (c) how parent stakeholder relationships are established and sustained to provide students enhanced educational experiences in STEM. By paralleling the experiences of principals in two differing communities, based on their student achievement outcomes in STEM and socioeconomic levels, the following themes emerged: access to learning opportunities, time constraints to develop and sustain

stakeholder relationships to enhance STEM standards, and methods to develop parents as leaders.

The school administrators serving within each school setting recommended a band of parent-leaders who were tapped to plan and implement a community STEM resource fair at their respective local libraries. The parent-leaders met to construct a list of STEM-based academic amenity partners who could potentially participate at the fair to inform parents within their communities about the programming they offer which align to the learning their children experience in school. These partners were invited to attend, and present and register families for future programming opportunities, including tutoring, workshops, and camps.

The academic amenity providers were invited by the parent-leaders, and when applicable, the researcher participated in a survey prior to the fair to collect data on how their program was aligned to STEM learning standards and the strategies used to develop critical thinking. Questions regarding the latter focused on how each strategy used by academic amenity providers mirrored the varying levels within Bloom's Taxonomy.

Description of the Setting

Octantis Community is situated within a half hour drive from some of Atlanta's most recognizable landmarks: the Georgia Dome, the World of Coke, and Centennial Park. A collection of seven universities surround this sparsely populated community, including Georgia Tech, Clark Atlanta University, and Morehouse College. Peppered throughout the commodious community are a series of fast food establishments and service-oriented businesses. Market segmentation data from ESRI, a research and

development firm founded by Jack Dangermond, informs that the neighborhood can be classified into three classifications: Up and Coming Families, Family Foundations, and Metro Fusion. These categories indicate that households are comprised of younger married families occupying single-family homes that enjoy watching films at home, families who live in mixed generational structures often due to unemployment, and culturally diverse households who reside in rentals and engage in impulse shopping (http://www.esri.com/data/esri_data/ziptapestry).

Sixty miles of Octantis Community is Polaris Community, a neighborhood adjacent to the picturesque Chattahoochee River and established in 1996. Throughout Polaris Community, luxurious gated home communities border a sprinkling of eateries, boutiques and family-friendly attractions. The community includes a 1,900 acre technology park employing 10,000 employees and recreational areas to play tennis, ride horses, and fence. The expanse of these two communities provides an antithetical living experience for their respective denizens. One is new and a freshly minted community, while the other is accessible to metro-Atlanta's rich local and national history.

A demographic comparison of the two neighborhoods presents some of the strengths and weaknesses inherently apparent within affluent and poverty challenged communities. Zip code data have been used as a proxy to establish some of the data points for Octantis Community. The local high schools, called Polaris HS for Polaris Community and Octantis HS for the Octantis Community, were used to ascertain free and reduced meals. A demographic comparison of the Polaris and Octantis Communities is illustrated in Table 1.

Table 1

Demographic Comparison of Polaris and Octantis Communities

Demographic	Data		Source
Population Size	Polaris Community	39,659	www.city-data.com
	Octantis Community	67,904	
Racial/Ethnic Distribution	Polaris Community	White – 48.7% Asian – 32.9 % Black – 10.7% Other – 7.7%	www.city-data.com
	Octantis Community	White - 3% Asian – 1.1 % Black – 91% Other – 4.9%	www.city-data.com
Median Income	Polaris Community	$150,592	www.city-data.com
	Octantis Community	$45,074	
Unemployment	Polaris Community	6.2%	www.city-data.com
	Octantis Community	14.8%	
Free and Reduced Meals	Polaris Community	8%	Georgia Department of Education (HS as Proxy)
	Octantis Community	85%	

Table 1 shows the economic disparity between the two comparative communities of Polaris Community and Octantis Community. The former has a median household income rate nearly triple than that of the latter. During the fall of 2013, in an effort to decide how to best market its community, the municipality of Polaris Community distributed a survey to its residents which asked its respondents to describe Polaris Community with 11 preselected terms: Diverse, Manicured, Gated/Exclusive,

Affluent/Wealthy, Suburban, Great Quality of Life, High-Tech, Welcoming, Safe, Great Schools, and Young City. This survey activity serves as an example of how the community proactively seeks to define and brand itself. Possessing a collection of schools that exceed expectations and that could be deemed "great" is one of less than a dozen branding benchmarks it potentially seeks to make synonymous with its name. Polaris Community's 19 area public schools are listed as some of the highest performing within the metro Atlanta area. The SAT score performance of Polaris Community's Polaris High School is only second in metro Atlanta to a charter magnet program serving students in the adjacent school district and which utilizes an extensive application process (Tagami & Washington, 2013). Tagami and Washington's report linked community wealth and student achievement and demonstrated that based on data extrapolated by The Fair Testing organization and the two variables of achievement and wealth are directly correlated.

Student achievement data for Octantis Community's neighborhood high school tells a very different story. School achievement data in science and math indicate that students in elementary through high school are academically struggling to pass end of course exams administered by the state.

To support the instruction occurring in Polaris Community's "great" schools are 57 licensed businesses classified as tutoring, exam preparation and educational support service providers. With 27% of its population falling within the P12 age brackets of 5 through 19 years of age, Polaris Community has a student to community academic support ratio of 363:1.

Sampling Procedures

A survey was distributed to more than 40 students attending elementary or middle school between grades 4 through 8 at two different sites. Teachers and administrators providing instruction to these students were invited to voluntarily participate as respondents to an open-ended survey instrument inquiring about the level of parent involvement and student achievement in STEM occurring within their school. To assist with efforts of identifying respondents, the researcher met with personnel in the district office.

To reduce the inherent risk of bias, as noted by researcher Louis Cohen, a probability sample was conducted to net a randomized representation of the larger population. Simple random sampling was conducted by selecting at random from the overall population the target number of participants for each survey instrument (Cohen, 2000).

Working with Human Subjects

This dissertation research involved the use of human subjects to gauge both the attitudes and behaviors which impacted parental involvement, student achievement, school decision-making, and the acquisition of community resources impacting STEM achievement of students. Two communities of differing affluence levels within metro Atlanta served as sites to secure samples of stakeholders, including one administrator from each site, 40 parents collectively from both sites, 40 students in grades 4 through 8 collectively from both sites, and 10 community-based organizations offering academic programs related to STEM studies. All participation was voluntary and a written consent

form, including the name of the researcher, intent of the study, and rights of the respondents, was furnished to all respondents. Additionally, respondents' identities were protected through the use of pseudonyms for all interview questions. Quantitative data solicited through multiple choice surveys were reported in the aggregate to ensure a blind analysis of responses was conducted.

Instrumentation

To ascertain the impact of social capacity on student achievement in STEM, a participatory treatment was designed to include the following:

1. Parent participants from both research sites were invited through print and online materials to design and implement a STEM resource fair on behalf of their schools' students. Each site's local library was invited to participate as a host site for the fair. These participants collectively served as a Community STEM Task Force.
2. Participating parents were invited to complete an instrument to investigate their behaviors and attitudes which may relate to their child's achievement in STEM-related instruction. Included questions probed the frequency and type of academic activities their children engaged in outside of school hours, the level of assess to academic learning opportunities held in and outside of school, and their involvement in their school's decision-making and activities related to STEM instruction.
3. A training meeting was held to introduce the parent participants to each other, goal set, and identify resources and strategies. This meeting included training

on how to engage peers, recruit community participants, and evaluate impact. An observation form provided the researcher an opportunity to collect data regarding participation, including number of attendees, questions posed, and feedback shared.

4. The parent participants created a list of community resource providers to participate in the STEM community fair.
5. The researcher invited each community resource provider to complete a survey instrument to evaluate the content and strategies of their STEM-based programs.
6. Providers' participation at the event included the opportunity to display and distribute materials to alert families of their programs. They were encouraged to showcase their work through hands-on demonstrations and to recruit participants by conducting giveaways.
7. Parent participants were tasked to also create and conduct strategies to recruit family participants to attend the fair.
8. A sign-in sheet at each site's fair enabled the researcher to collect data on the number of family participants attending each fair and how many families signed up for academic opportunities on-site from the contingent of Community STEM providers. The researcher was in attendance during each fair to observe the activities and used the sign-in sheet as part of the observation. An observation form provided the researcher an opportunity to collect data regarding participation, including number of attendees, questions

posed, and feedback shared. Table 2 shows the instrumentation matrix for this study.

Table 2

Instrumentation Matrix

Instruments	Administrator Survey	Parent Survey	STEM Resource Provider Survey	Observation Form
RQ1	Q10	Q21, Q22, Q25, Q26	Q9, Q10, Q11, Q13,	Q1, Q2
RQ2	Q14		Q16, Q17, Q18,	
			Q19, Q20, Q21,	
			Q22	
RQ3		Q19		
RQ4	Q2	Q23		
RQ5	Q12, Q13	Q5, Q12, Q14		Q5
RQ6	Q11		Q13, Q14	Q2, Q3
RQ7		Q3		
RQ8		Q15, Q20, Q27, Q28		
RQ9	Q6, Q7, Q8, Q9	Q6, Q7, Q8, Q9,		Q4
		Q14, Q16, Q17, Q18		
RQ10		Q21, Q22, Q23, Q24	Q15	
RQ11				
RQ 12				

Instruments	Document Analysis	Stakeholder Interview	Advisory Member Interview
RQ1	Q5		
RQ2	Q5		

(continued)

Table 2 (continued)

Instruments	Document Analysis	Stakeholder Interview	Advisory Member Interview
RQ3	Q5	Q2, Q3, Q4, Q5, Q8, Q9	Q5, Q11, Q12, Q13, Q14, Q15, Q19
RQ4	Q5	Q9	Q1. Q2, Q3, Q4, Q5, Q16, Q17, Q18, Q20, Q21
RQ5	Q5	Q5	
RQ6	Q5	Q7	Q3, Q4, Q5, Q6, Q20, Q21
RQ7	Q5	Q5	
RQ8	Q5	Q5	
RQ9	Q5		
RQ10	Q5	Q6, Q10	Q10, Q16, Q17,
RQ11	Q5	Q6, Q10	Q11, Q12, Q13, Q14, Q15, Q19
RQ 12	Q12		

Data Collection Procedures

After creating electronic surveys for each stakeholder, including parents, students, administrators/teachers, and STEM Resource providers, and securing all approvals to conduct research through the participating school district, the researcher met with district personnel to secure two sites to conduct the treatment. Upon identifying the sites, the researcher met with each site's administrators to discuss the intent of the study and to secure respondents among the student body, parents of students, and teachers who instruct students in grades 4 through 8. With the assistance of the administrators, including identifying and inviting parents, a training of parents who signed up to lead the implementation of the STEM Community Resource Fair was conducted. The researcher observed both the activities of the parents leading the fair, as well as the activities of

parents who attended. These observations included noting the interaction between parent participants to note their familiarity with each other and the process of working collaboratively in a peer group. Their questions, responses, and actions related to goal setting and constructing a parent-led initiative were noted to identify any emerging themes related to social capacity and social networking.

Statistical Application

Quantitative

With the use of the Statistical Package for the Social Sciences (SPSS) software, the researcher analyzed the relationship between the dependent and independent variables cited within the study.

Qualitative

Themes from observational tools and open-ended instruments were extrapolated to identify patterns related to the correlation between the dependent and independent variables.

Summary

The researcher designed and conducted a series of surveys with a smattering of stakeholders, including academic amenity providers, parents, and school staff members. These instruments provided the researcher insight into the possible correlation between student achievement in STEM and the actions and attitudes of stakeholders, including the level of access to academic amenity opportunities and parental involvement in the school.

CHAPTER V

ANALYSIS OF THE DATA

This chapter presents an analysis of the data obtained from a series of instruments, including a parental survey accessed electronically by 38 respondents with 34 completing it in totality. Interviews were conducted among a team of STEM youth conference committee members and surveys were collected from varied school personnel and STEM-based academic amenity providers who provided instructional services to P12 populations. Within this chapter the research design is described along with the setting and procedures used to select participants.

The researcher developed a mixed-methods design to explore the correlations between the independent and dependent variables. The study investigated STEM achievement across diverse socioeconomic populations as a possible outcome of social capital between stakeholders.

Research Design

The dependent variable of student achievement in STEM was explored as an outcome of 11 core independent variables being enacted within the community environment. Mutualism, a relationship in which two parties rely upon each other, was explored as a factor of the relationship building between stakeholder groups of parents, amenity academic providers, and school personnel. The study investigated how this

compilation of stakeholders including families, school personnel, and instructional resource providers work together for the intended purpose of students achieve academically in the school setting. Each party's reliance on other members of the social network—the community—enables the entity to form bonds and channels to develop, implement, and disperse communication and services for the benefit of attaining the shared goal of raising student achievement. The independent variables selected for this study relate to each of the stakeholder's capacity to function as a provider, access channel or recipient of services. These variables include access to academic amenities, the quality of instruction with academic amenities, parent involvement, community cohesiveness, parents' backgrounds, community values, and expectations, racial identity, socioeconomic status, students' academic extracurricular participation, and community resource acquisition.

The implication for educational leaders is addressed in the study by demonstrating which factors existing beyond the school environment can impact student achievement and which stakeholders within the community can support the development of decision-making to support student success. The decision-making made by educational leaders, including which community partnerships to foster, can therefore be informed by the findings of the study.

The Setting

A large metro city within the southeast United States was selected as the setting for the study. The initial setting was narrowly focused on one school district served by the nonprofit; however, due to the expansive reach across all adjacent counties and school

districts, the study was expanded to include the metro area at-large. Demographic data of the parental survey respondents were captured in Table 3. The nonprofit serves approximately 400 students annually for each youth STEM conference and self-reports that the vast majority (90%) of their population served is African American or Hispanic.

Table 3

Demographic Data of Parental Survey Respondents

Demographic	Number
Gender	
Female	29
Male	5
No Response	4
Age	
35-44	16
45-54	16
55-64	2
No Response	4
Race/Ethnicity	
African American	29
Caucasian	1
Multicultural	4
No Response	4
Household Income Levels	
Below $34,999	8
$35,000 - $74,999	10
Above $75,000	16
No Response	4

(continued)

Table 3 (continued)

Demographic	Number
Educational Attainment	
High School Equivalent	1
Some College Credit/No Degree	5
College Degree	28
No Response	4

Analysis of the Data

The 32-item parental questionnaire canvassed participants in STEM youth conferences held by the nonprofit youth program involved in the study. The nonprofit sent out an email to each of their conference participants and included a link to the survey on their Facebook page, one of their social media vehicles used to keep connection with their stakeholders, to invite participation in the study. STEM amenity providers participated in the survey by completing a 32-item questionnaire instrument to gauge the methods in which they impart instruction within their program, as well as the structure of their programs as they relate to access. A document analysis was conducted of the websites of these participating providers to ascertain the mission of each organization and a snapshot of the programming each offers. The nonprofit, that offers these conferences each year within the Atlanta region, services a smattering of students across school types including traditional public, charter, private, and the home-school setting. The amenity providers are vetted to ensure that the work they conduct is in alignment with their marketing material. Annually, to participate within the conference, providers must attend a facilitator training to introduce themselves to the contingent of fellow facilitators and

the nonprofit's advisory board. During this session, the advisory board provides training on engagement youth strategies to ensure the attendees have an enriched experience through hands-on simulation and collaborative activities. Since the nonprofit extends the conference to a network of facilitators and students throughout the metro region, an urban setting with a large minority population, the school stakeholder survey was open to an array of educators through a social media Facebook group that has membership in primarily urban settings. Triangulation of data was further achieved by including an instrument which interviewed the team of participants who annually develop and host the youth conference.

The respondents who completed the parental survey included 29 who self-identified as female and 5 who self-identified as male with the balance of instruments not completed and not included in the data for qualitative analysis. The age ranges were nearly evenly split between 35 to 44 years of age and the 45 through 54 age range, with 16 identifying in each and 2 respondents identifying in the 55 through 64 age range. Overwhelmingly, the respondents self-identified as African American (29), and 4 respondents self-identifying as multiracial. Household incomes for the respondents fell mostly in the above $75,000 range with 16 respondents identifying within this category and 10 identifying in the $35,000 through $74,999 range; 8 respondents responded that their income was below $34,999. Educational attainment was presented as high with 28 self-identifying with attaining a college degree, 5 self-identifying some college credit or no degree, and 1 identifying as achieving high school or equivalent degree.

Demographically, the average parental survey respondent of this study was African American who possessed a college degree with a household income exceeding $75,000.

The parental survey instrument asked a series of questions regarding student achievement, the dependent variable, questions regarding resources available for improving student achievement, their levels of parental involvement, and how opportunities for access for participation in academic instruction outside of the school environment. The instrument questions 22 through 32 are presented in Table 4. Out-of-school-time opportunities were regarded as opportunities for advancement in school with 79.4% of all respondents strongly agreeing that they believe that extracurricular activities their children were involved in impacted their child's achievement in school. This connection may also further add to the overall school environment and culture as extracurricular activities build cohesiveness between participant stakeholders. Respondents also overwhelmingly believed that their community values student achievement with 55.9% strongly agreeing and 35.3% agreeing. Funding availability, however, was not clearly agreed-upon by the respondents. Although more than half responded that they agreed or strongly agreed that funding was available within your community to provide resources to support all children within the community nearly 40% responded that they either disagreed or were neutral.

Table 4

Parental Perception of Student Achievement and Academic Community Resource

		5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree
22	I believe that the extracurricular activities my child(ren) are involved in help them achieve in school	27 79.4%	6 17.6%	1 2.9%	0 0%	0 0%
23	I believe that my community values student achievement	19 55.9%	12 35.3%	2 5.9%	0 0%	1 2.9%
24	I believe my community has the funding needed to provide resources to support student achievement for all children within my community.	7 20.6	11 32.4%	5 14.7%	7 20.6%	4 11.8%
25	I believe my community knows how foundations and community giving programs help to provide additional funding to resources such as the library	8 23.5%	12 35.3%	9 26.5%	5 14.7%	0 0%
26	I am satisfied with the quality of resources offered in my community that assist in my child's learning.	4 11.8%	12 35.3%	7 20.6%	6 17.6%	5 14.7%
27	I believe that my child’s achievement in school can be improved with resources currently available in my community.	5 14.7%	18 52.9%	6 17.6%	4 11.8%	1 2.9%
28	I believe that my child’s achievement in school can be improved by adding additional resources in my community.	14 41.2%	15 44.1%	4 11.8%	0 0%	1 2.9%

(continued)

Table 4 (continued)

		5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree
29	I am satisfied with the academic resources, including print, technology and programming/services, available at my local library to support my child's academic achievement.	2 5.9%	12 35.3%	11 32.4%	8 23.5%	1 2.9%
30	I believe community members can ensure academic resources to support student achievement are available.	13 38.2%	15 44.1%	3 8.8%	2 5.9%	1 2.9%
31	I believe that the learning which occurs outside of school impacts student achievement.	27 79.4%	7 206%	0 0%	0 0%	0 0%
32	I believe that STEM education is important for the future economy.	29 85.3%	4 11.8%	1 2.9%	0 0%	0 0%

The survey further shows the confidence parents have regarding the quality of resources that were being offered and whether these assisted in their child's attainment of academic achievement. Respondents' perception varied greatly with responses to constructs falling across all ranges in the Agree and Disagree selection categories. Although most respondents believed that their child's achievement in school could improve with resources currently available within their community, with 23 responding Strongly Agree or Agree, nearly all respondents agreed or strongly agreed that the additional resources would assist their child going forward. This demonstrates that although some opportunities do exist within the community, parents believe that their child's achievement can be improved further if additional access was provided. One

source of contact for out-of-school-time learning opportunities was within the public library system. Respondents of the perception of the parental survey instrument indicated that some were satisfied with the academic resources available at the local library with 5.9% strongly agreeing but they were satisfied, 35% agreeing that they were satisfied, and 32.4% indicating that they were neutral. However, nearly a quarter responded that they were not satisfied, with 23.5% disagreeing and 2.9% strongly disagreeing that the academic resources, including print, technology, and programming services, support their child's academic achievement. So although all communities within the setting had access to a local library, not all parents were satisfied that the local library in their community offered the needed support through the resources to improve student academic achievement. Question 31 on the instrument helped show that library systems could be of use to communities through the expansion of services. All respondents agreed that the learning which occurs outside of school impacted student achievement, with 79.4% strongly agreeing and 20.6% agreeing. Therefore, opportunities existing outside of the school environment for academic learning were believed to be of importance to parents in students achieving academically.

Social capital is defined as the resources and relationships developed between parties within a network based on shared values goals. This study identified the dependent variable with a community, the social network, as student achievement. Question 30 on the parental survey which asked respondents whether community members can ensure academic resources to support student achievement are available yielded 38.2% of respondents strongly agreeing and 44.1% agreeing. This demonstrates

that the vast majority of respondents believed that they had an integral component of the social capital dynamic: the people resource to effect change within their community.

The last question of the survey asked parents whether they believed that STEM education was important for the future economy. Nearly all respondents agreed or strongly agreed that this was true, with 97.1% falling into these two categories. Within the qualitative analysis section of this chapter includes an analysis of the websites of STEM academic amenity providers who rendered service through workshop facilitation at the nonprofit's youth STEM annual conference and provide other access points to STEM learning. The researcher's analysis showed an alignment of the parental respondents' perception of the importance of STEM learning to the economy and the academic amenity providers sharing the same belief.

The parental survey also informed about the level of parental involvement and student academic support children receive. Findings from this portion of the parental perception instrument are compiled on Table 5. More than half of children prior to entering kindergarten were cared for primarily at a daycare center, with 55.9% of respondents indicating that this was the placement of their child prior to entering school. Homework support for school project support at home mostly occurred without the support of supervising adults. A large portion of respondents, 70.6%, indicated that their child completed homework and school projects or assignments by themselves.

Table 5

Parental Involvement and Student Academic Support

Before my child(ren) entered kindergarten, they were primarily cared for during the day	
Answer Options	**Response Percent**
At home	29.4%
At a day care center	55.9%
Other	14.7%
When my child is completing HW or school projects/assignments, they mostly	
Answer Options	**Response Percent**
Complete the work by themselves.	70.6%
Complete the work with my help.	29.4%
Other	0.0%
When my child(ren) needs assistance with school work, mostly	
Answer Options	**Response Percent**
I can and do assist them.	70.6%
I can sometimes assist them.	11.8%
I find resources to help them.	14.7%
I rely on my child's school to help them.	0.0%
My child does not receive help.	2.9%
My child(ren) participate in the following extracurricular activities	
Answer Options	**Response Percent**
Service/civic organization	14.7%
My child(ren) participate in the following extracurricular activities	
Answer Options	**Response Percent**
Academic tutoring	17.6%
Mentoring	8.8%
Arts, Visual	2.9%
Language Studies (Latin, French, Korean, Chinese, Arabic, German, Other	0.0%

(continued)

Table 5 (continued)

Arts, Performing (Drama, Dance and/or Music)	14.7%
Sports	26.5%
Technology, Computer Programming	0.0%
Technology, Robotics or Engineering	14.7%
I find activities to support my child's learning from the following resources	
Answer Options	**Response Percent**
From my child(rens') school	29.4%
From my local library	2.9%
In the newspaper	2.9%
From postings within the community, including stores	0.0%
Social Agencies, DEFACS or other	0.0%
Government Offices, Parks and Rec or other	0.0%
Social Media, including Twitter, Facebook or Instagram	5.9%
I find activities to support my child's learning from the following resources (continued)	
Answer Options	**Response Percent**
Online from internet searched and websites	41.2%
From my church/faith-based organization	2.9%
From friends/neighbors	8.8%
Other	5.9%

When their child did seek assistance with their schoolwork, most respondents indicated that they could and did assist them, with 70.6% responding as such with 11.8% of respondents indicating that they could not sometimes assist them; 14.7% indicated that they found resources for their child to support them. Nearly all respondents indicated that their child was involved in some form of extracurricular activity with approximately one quarter participating in sports with 26.5% responding near only one out of 12 participating in mentoring with 8.8% responding.

Sourcing opportunities available for their child's learning involved reaching out to the social network's members, including social service agencies, friends, faith-based organizations, family/friends and schools, along with online media outlets: the Internet and social media platforms. Of these sources, parents indicated that they were heavily reliant upon their children's school with 29.4% responding that it is their source for finding activities. However nearly one in 10 parents indicates that they learn from their social network of friends and neighbors with 8.8% responding. Social media was an additional source for informing about in resources with 5.9% indicating that the platforms such as Twitter, Facebook, or Instagram, aided in accessing information while an overwhelming 41.2% indicated that online from Internet searches on websites accounted for finding out about opportunities. The researcher included constructs to delve into the intersectionality between media richness, the use of technology and the relationships forged between parents and schools.

To investigate how social media as a component of media richness impacts social capital, the parental survey also included questions regarding social media use occurring between parents and school personnel. Parents indicated that when they use social media that most with 76.5% responding that they use Facebook as a platform while 5.9% use Instagram, 2.9% use YouTube, and 8.8% of respondents selected "Other" forms of social media not listed. Only 5.9% selected that they did not use social media at all. Three-quarters of respondents, 73.5%, responded that they will be willing to use social media to connect to personnel at their children's school, including their children's teachers. Social media usage to share for information about upcoming opportunities between themselves

and other parents and community members was higher with 94.1% indicating willingness to connect with their peers using social media platforms. This is an indication that although most parents are finding out about opportunities through their schools and have some willingness to use social media to connect with their children's teachers that many more would utilize social media to connect with their peer group of parents and community for the benefit of their children's achievement (see Table 6).

Table 6

Social Media Use between Parents and School Personnel

When I use social media, I use	
Answer Options	**Response Percent**
Instagram	5.9%
Twitter	0.0%
YouTube	2.9%
Facebook	76.5%
I do not use social media	5.9%
Other (please specify)	8.8%
I would be willing to use social media to connect to personnel at my child's school, including their teachers	
Answer Options	**Response Percent**
Yes	73.5%
No	26.5%

(continued)

Table 6 (continued)

I would be willing to use social media to connect to other parents and community members to share information about upcoming opportunities	
Answer Options	**Response Percent**
Yes	94.1%
No	5.9%

STEM academic amenity providers who participated as facilitators in the nonprofit's annual STEM youth conference were surveyed. Table 7 details that the organizations within the study mostly self-identify as nonprofits with 66.7% indicating nonprofit status and 33.3% indicating for profit status. Half of the organizations, 50%, responded that they are have been established over five years ago while 83.3% of respondents completing the survey instrument identifies male and more than half indicate that they are above 35 years of age with 16.7% identifying that they fall between 45 to 54 years of age 50% indicating that they are 35 to 44 years of age and 33.3% indicating that they are between the ages of 22 and 34. All respondents indicated that their race with the city is African-American. The organizational role of the respondents was 33% identifying as the lead instructor and 50% identifying as the owner of their for-profit entity.

Table 7

STEM Academic Provider Demographics

Organizational Status	**Nonprofit**	**For Profit**			
	66.7%	33.3%			
Age of Organization	**Within the Last 24 Months**	**With the Last 3-5 Years**	**Over Five Years Ago**		
	16.7%	33.3%	50%		
Gender of Respondent	**Female**	**Male**			
	16.7%	83.3%			
Age of Respondent	**Under 21**	**22-34**	**35-44**	**45-54**	**Over 55**
	0%	33.3%	50%	16.7%	0%
Ethnicity of Respondent	**African American**	**Caucasian**	**Latino**	**Asian**	**Multiracial**
	100%	0%	0%	0%	0%
Role of Respondent	**Founder, Non-Profit**	**Owner, For Profit**	**Executive Director**	**Lead Instructor**	**Other**
	0%	50%	0%	33%	33%

Survey questions 8 to 13 aided the researcher in ascertaining the program access and the process for participation in the academic amenity STEM programs. Table 8: STEM Academic Amenity Participant Recruitment and Program Access records the responses of the academic amenity providers. Half of the respondents, 50%, indicated that their primary method of attracting program participants is through establishing local school partnerships while 33% indicated that they utilize all forms of social media marketing and 16.7% indicate that they secure their participants through other means. The social network relationships established and nurtured within the community between schools and academic amenity provider stakeholders create channels of access to students. Participants indicated that there they use social media with 50% utilizing

Facebook and 50% using other and no responded indicating that they utilize Instagram Twitter for you to as a method for engaging their stakeholders. Frequency of social media amongst providers runs the gamut with 33% indicating that they post update I'll communicate with their stakeholders daily while 16.7% indicate their usage between 1 to 2 times per week but not daily and 16.7% indicating 1 to 2 times per week usage. Other women as a category for usage were indicated by 33.3% of respondents.

The average range of program participants is between 9 to 14 years of age as evidenced by respondents indicating that 66.7% participants in the program within this range 16.7% indicate that they are average participant is over the age of 14 while 16.7% indicate that there ever is under the age of nine. To participate in the providers programs 50% of respondents indicated that there are fees associated which are paid by the participants 16.7% indicate that they received grants or other funding sources while 33.3% indicate that there is no fee charged for participation. The average cost for participation ranges greatly with 33.3% indicating that the cost per participant per session is less than five dollars while the same number of 33.3% indicates that their participation fee rate is over $25. One-third of the participants indicate that their fees per participant/ per session range between these two costs (see Table 8).

Table 8

STEM Academic Amenity Participant Recruitment and Program Access

What is the PRIMARY method of attracting program participants?

Answer Options	Response Percent
Through local school partnerships	50.0%
Through print ads in local magazines or papers	0.0%
Through online or social media marketing	33.3%
Through referrals from past customers or a membership base	0.0%
Through 'foot traffic'	0.0%
Other (please specify)	16.7%

If social media is used, which of the following is used by your organization to engage with your stakeholders?

Answer Options	Response Percent
Instagram	0.0%
Twitter	0.0%
YouTube	0.0%
Facebook	50.0%
Other (please specify)	50.0%

If social media is used, how frequently does your organization post updates or communicate with stakeholders?

Answer Options	Response Percent
Daily	33.3%
More than 1-2 times per week, but not daily	16.7%
1-2 time per week	16.7%

(continued)

Table 8 (continued)

1-2 times per month	0.0%
Other (please specify)	33.3%
What is the MEDIAN AGE (average age) of your program participants?	
Answer Options	**Response Percent**
Under age 5	0.0%
Between the ages of 5-8	16.7%
Between the ages of 9 through 14	66.7%
Over age 14	16.7%
Does your program(s) involve a fee for participation?	
Answer Options	**Response Percent**
Yes, paid by the participants	50.0%
Yes, paid by a grant or other funding sources	16.7%
No, fees are not charged for participation	33.3%
What is the AVERAGE COST per participant, per session? (Divide the total monthly overhead of your program by the number of participants.)	
Answer Options	**Response Percent**
Less than $5.00 per participant	33.3%
Between $6.00 and $10.00 per participant	16.7%
Between $10.00 and $25.00 per participant	16.7%
Over $25.00 per participant	33.3%

The researcher created an instrument disseminated to school-based personnel who self-identify as educators or administrators and are members of a social media group for educators. Of these respondents, 35.7% self-identified that their school type is an

elementary school, 35.7% indicated that their school type is a middle school and approximately one-quarter, 28.6%, selected "Other" as their school type. Nearly all respondents, 92.9% indicated that some to most of their students are recipients of free or reduced meals and of which 4 out of every 10 responded that most of their students qualify for free or reduced meals. The respondents were mostly female, 85.7%; over the age of 35, 78.5%; and serve as an administrator, 85.7% to nine on the instrument inquired about the parental involvement occurring at each respondent's school site. The respondents use media to promote parental involvement by listing the volunteer opportunities on their websites and online through social media platforms, 57.1% and 71.4%, respectively. Most respondents indicated that a few students have one or more who volunteer once per year, 64.3%, and that these volunteer opportunities are initiated by the school and not elf-initiated by their parent body, 57.1%. Respondents were split in the middle, 50%, with offering training to their parental volunteers. Joyce Epstein's Framework of Six Types of Involvement includes a hierarchal typology enumerating Decision-Making and Collaborating with the Community as the highest two forms of parental involvement. The researcher suggests that the school stakeholders' responses are an indication that parents are not being developed as leaders and decision makers at the school setting.

Construct 11 posed questions regarding the relationships established between the social network members of schools and academic amenity providers. Most respondents, 92.9%, indicated that their school's partners did not offer out-of-school-time learning opportunities. This response is incongruent with the data elicited from academic amenity

providers who listed school partnerships, as the primary vehicle for attracting program participants. This disconnect is an apparent breach in the social networks relationship and a potential barrier for achieving the overarching intended goal of meeting student success. Construct 10 inquired ho parents are informed by the school of potential learning opportunities. More than half, 57.1%, utilize a newsletter to inform parents, while 42.9% disseminate information about opportunities on their website. Approximately one in five, 21.4%, offers a printed directory of learning opportunities. Constructs 12 through 14 posed questions regarding the impact of out-of-school-time (OST) opportunities. Nearly three-quarters, 71.4%, of respondents indicated that less than 35% of their students participate in OST. Nearly all of the respondents perceive that engagement of OST is a factor in higher achievement in STEM, 92.9%. Furthermore, the respondents trusted that the strategies employed by academic amenity providers were effective in leading to STEM achievement, 85.7%. The researcher posits that although school stakeholders have a trust of the impact of OST on STEM achievement and the ability of academic amenity providers' instructional strategies, few students have an opportunity to engage in this learning outside of the school environment (see Table 9).

Table 9

School Stakeholder Survey

Your school type	
Answer Options	**Response Percent**
Elementary School	35.7%
Middle School	35.7%
Other (please specify)	28.6%
Describe the Socioeconomical Level of Your School:	
Answer Options	**Response Percent**
Most Students Qualify for Free or Reduced Meals	42.9%
Some, But Not Most Students Qualify for Free or Reduced Meals	50.0%
Not Many Students Qualify for Free or Reduced Meals	7.1%
Your Gender	
Answer Options	**Response Percent**
Female	85.7%
Male	14.3%
Your Age	
Answer Options	**Response Percent**
18-21	0.0%
22-34	21.4%
35-44	57.1%
45-54	21.4%
55 and over	0.0%

(continued)

Table 9 (continued)

Your Role within Your School	
Answer Options	**Response Percent**
Administrator	85.7%
Teacher	7.1%
Other (please specify)	7.1%
What is the level of parental involvement within your school:	
Answer Options	**Response Percent**
Nearly all of the students have one or more family members who volunteer for at least one activity per year (90 % or more)	0.0%
Many of the students have one or more family members who volunteer for at least one activity per year (between 50% and 89%)	14.3%
Some of the students have one or more family members who volunteer for at least one activity per year (between 25% and 49%)	21.4%
A few of the students have one or more family members who volunteer for at least one activity per year (less than 25%)	64.3%
Do your parents receive training to lead or serve as volunteers?	
Answer Options	**Response Percent**
Yes	50.0%
No	50.0%
Do your parents self-initiate volunteer opportunities?	
Answer Options	**Response Percent**
Yes, they have initiated by forming their own committees	7.1%
Yes, they have initiated by creating programming for student learning	0.0%

(continued)

Table 9 (continued)

Yes, they have initiated by identifying resources our school has or currently uses	0.0%
Yes, Other	35.7%
No, they do not self-initiate volunteer opportunities	57.1%

How are parents informed of volunteer opportunities? (Check all that Apply)

Answer Options	**Response Percent**
We provide printed fliers or newsletter	71.4%
We post opportunities on bulletin boards	50.0%
We post information in an online social media source or send text messages or emails	71.4%
Yes, we post information on our website	57.1%

Does your school have a directory or other means of informing families of out-of-school-time learning opportunities? (Check all that Apply)

Answer Options	**Response Percent**
Yes, we have a directory, in print	21.4%
Yes, we have a directory, on line	0.0%
Yes, we post information in a newsletter	57.1%
Yes, we post information on our website	42.9%

How many of your school partners offer out-of-school-time learning opportunities?

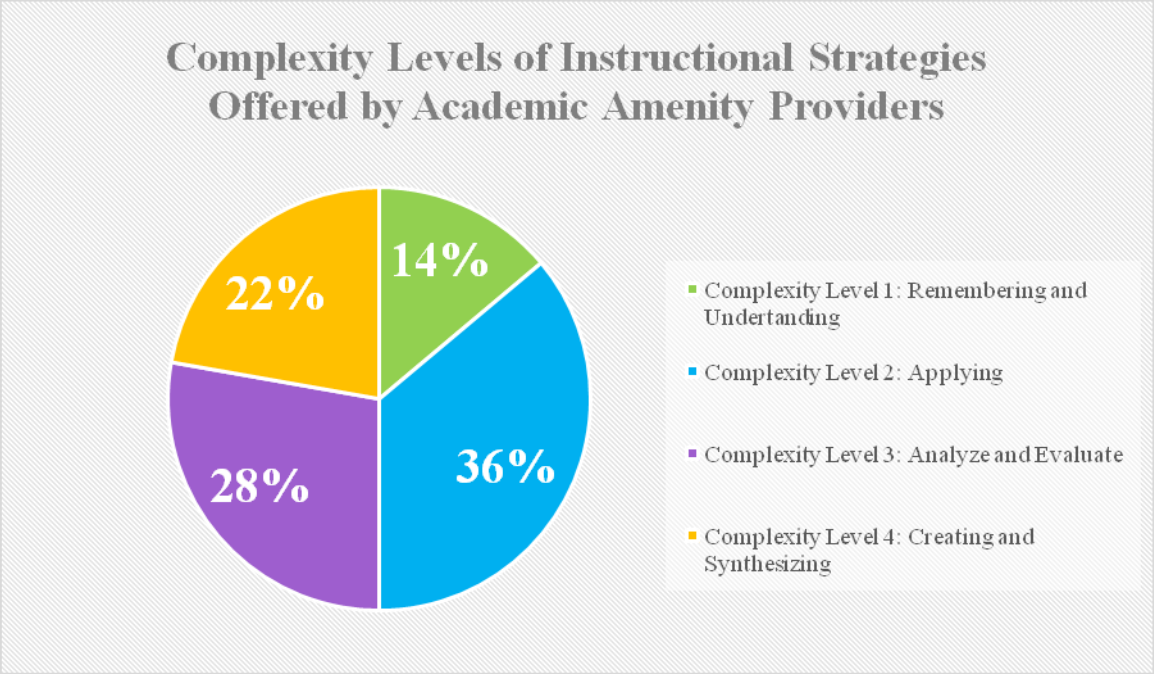
Answer Options	**Response Percent**
Most (50% or More)	0.0%
Some (Between 35 and 50%)	7.1%
Not Many (Less Than 35%)	92.9%

(continued)

Table 9 (continued)

How many of your students participate in out-of-school-time learning opportunities?	
Answer Options	**Response Percent**
Most (51% or More)	7.1%
Some (Between 35 and 50%)	21.4%
Not Many (Less Than 35%)	71.4%
Do you believe students who engage in out-of-school academic learning activities experience higher STEM achievement?	
Answer Options	**Response Percent**
Yes	92.9%
No	7.1%
Do you believe out-of-school academic learning activities use effective strategies to lead to higher STEM achievement?	
Answer Options	**Response Percent**
Yes	85.7%
No	14.3%

The quality of instruction imparted by the academic amenity providers was analyzed based on the responses from constructs 21 to 32 of the Academic Amenity Provider Survey instrument. Figure 12 categorizes responses for construct 21, which enumerated 35 types of activities with varying complexity levels. The researcher categorized each of the 35 choices based on their level of complexity and tallied the number of times respondents selected a specific complexity level activity.



Complexity Level 1: Remembering and Understanding	Complexity Level 2: Applying	Complexity Level 3: Analyze and Evaluate	Complexity Level 4: Creating and % Synthesizing
• Make a list of the main event • Make a facts chart • Retell the story in your own words • Write summary report of an event • Make a three-dimensional model of an item in the material	• Make a timeline • Cut out or draw a picture to show a particular event • Illustrate what you think the main idea was • Make a cartoon strip showing the sequence of events • Prepare a flow chart to illustrate the sequence of events • Make a map to include relevant information about an event • Take a collection of photographs to demonstrate a particular point • Make a diorama to illustrate an important event • Make a family tree showing relationships • Design a record, book or magazine cover for content being studied	• Make a scrapbook about the areas of study • Design a questionnaire to gather information • Make a flow chart to show the critical stages • Construct a graph to illustrate selected information • Create a new product • Design a building to house characters you are studying • Write a blog entry in the voice or person being studied • Create an app	• Invent a machine to do a specific task • Give it a name and plan a marketing campaign • Make up a new language code and write material using it • Design a website or social media campaign

Figure 12. Complexity levels of instructional strategies offered by academic amenity providers.

The respondents were allowed to select more than one choice and were not informed of the varying level of task complexities. Of the 19 tasks selected by respondents, few, 14%, were Level One: Remembering and Understanding. Over one-third of the respondents selected activities within the Level Two: Applying complexity level and nearly one of every four respondents, 36%, selected Level Four: Creating and Synthesizing tasks, which represents the tasks requiring the highest level of critical thinking. Few respondents selected Level Three: Analyzing and Evaluating Tasks, 28%. This informs that half of the tasks engaged in within OST by the academic amenity providers are lower level complexity activities, 50%. The activities engaged in by student participants may not be academic rigorous enough to raise the STEM achievement sought by the social network stakeholders of parents, academic amenity providers and student personnel.

Along with the strategies employed by academic amenity providers, the researcher deemed it important to ascertain the content alignment of their program activities with the state standards in math to evaluate how one component of STEM achievement can be impacted in school by the reinforcement of learning within an OST activity. The data gleaned from this section of the survey indicates that most of the middle grades math standards are not incorporated in to the earning activities by academic providers although most, 57.1%, indicate that their average age target for participants is between 9 through 14, the ages of students traditionally attending grades 4 through 8 (see Table 10).

Table 10

Alignment between Program Content and State Standards in Math

Does your program(s) involve the following instructional FOURTH grade math outcomes? (Check all that apply.)	
Our program DOES NOT involve any of the listed instructional FOURTH grade math outcomes.	20.0%
Use the four operations with whole numbers to solve problems.	20.0%
Gain familiarity with factors and multiples.	20.0%
Generate and analyze patterns.	40.0%
Find all factor pairs for a whole number in the range 1-100.	0.0%
Generalize place value understanding for multi-digit whole numbers.	0.0%
Use place value understanding and properties of operations to perform multi-digit arithmetic.	0.0%
Extend understanding of fraction equivalence and ordering.	20.0%
Build fractions from unit fractions.	0.0%
Understand decimal notation for fractions, and compare decimal fractions.	20.0%
Solve problems involving measurement and conversion of measurements.	40.0%
Represent and interpret data.	0.0%
Geometric measurement: understand concepts of angle and measure angles.	20.0%
Does your program(s) involve the following instructional FIFTH grade math outcomes? (Check all that apply.)	
Our program DOES NOT involve any of the listed instructional FIFTH grade math outcomes.	0.0%
Write and interpret numerical expressions.	50.0%

(continued)

Table 10 (continued)

Analyze patterns and relationships.	50.0%
Understand the place value system.	0.0%
Perform operations with multi-digit whole numbers and with decimals to hundredths	0.0%
Use equivalent fractions as a strategy to add and subtract fractions.	50.0%
Apply and extend previous understandings of multiplication and division.	25.0%
Convert like measurement units within a given measurement system.	50.0%
Represent and interpret data.	25.0%
Geometric measurement: understand concepts of volume.	25.0%
Graph points on the coordinate plane to solve real-world and mathematical problems	25.0%
Classify two-dimensional figures into categories based on their properties.	0.0%
Does your program(s) involve the following instructional SIXTH grade math outcomes? (Check all that apply.)	
Our program DOES NOT involve any of the listed instructional SIXTH grade math outcomes.	25.0%
Understand ratio concepts and use ratio reasoning to solve problems.	50.0%
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	25.0%
Compute fluently with multi-digit numbers and find common factors and multiples.	25.0%
Apply and extend previous understandings of numbers to the system of rational numbers.	25.0%

(continued)

Table 10 (continued)

Apply and extend previous understandings of arithmetic to algebraic expressions.	0.0%
Reason about and solve one-variable equations and inequalities.	0.0%
Represent and analyze quantitative relationships between dependent and independent variables.	25.0%
Solve real-world and mathematical problems involving area, surface area, and volume.	0.0%
Develop understanding of statistical variability.	0.0%
Summarize and describe distributions.	0.0%
Does your program(s) involve the following instructional SEVENTH grade math outcomes? (Check all that apply.)	
Our program DOES NOT involve any of the listed instructional SEVENTH grade math outcomes.	40.0%
Analyze proportional relationships and use them to solve real-world and mathematical problems	0.0%
Apply and extend previous understandings of operations with fractions.	0.0%
Use properties of operations to generate equivalent expressions.	0.0%
Solve real-life and mathematical problems using numerical and algebraic expressions and equations	0.0%
Draw construct, and describe geometrical figures and describe the relationships between them.	0.0%
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	40.0%
Use random sampling to draw inferences about a population.	0.0%

(continued)

Table 10 (continued)

Draw informal comparative inferences about two populations.	0.0%
Investigate chance processes and develop, use, and evaluate probability models.	20.0%
Does your program(s) involve the following instructional EIGHTH grade math outcomes? (Check all that apply.)	
Our program DOES NOT involve any of the listed instructional EIGHTH grade math outcomes.	40.0%
Know that there are numbers that are not rational, and approximate them by rational numbers.	20.0%
Expressions and Equations Work with radicals and integer exponents.	20.0%
Understand the connections between proportional relationships, lines, and linear equations.	20.0%
Analyze and solve linear equations and pairs of simultaneous linear equations.	20.0%
Define, evaluate, and compare functions.	0.0%
Use functions to model relationships between quantities.	0.0%
Understand congruence and similarity using physical models, transparencies, or geometry software.	0.0%
Understand and apply the Pythagorean Theorem.	20.0%
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	20.0%
Investigate patterns of association in bivariate data.	0.0%

The final question on the Academic Amenity Survey instrument inquired what type of assessments were used within the programs to capture the level of learning attained by participants. This information recorded in Table 11 includes a typo that lists "Q" as a selection choice that yielded 20% of respondents selecting this option.

Table 11

Assessment of Learning by Participants of Academic Amenity Providers

Answer Options	**Response Percent**
Participants complete a written evaluation at the end of the program.	20.0%
Participants complete a written evaluation at the end of each session.	20.0%
Participants complete a performance evaluation at the end of the program.	40.0%
Q	20.0%
Participants complete a performance evaluation at the end of the session.	0.0%

The remainder 80% of respondents were evenly split between written and performance assessments with 20% selecting written assessments after sessions, 20% selecting written assessments after program completion and 40% selecting performance assessments at the end of each session. Analysis of the data was further investigated by the researcher by interviewing members of the nonprofit's team who aid in developing the annual youth STEM conference.

Within the instrument, stakeholders were asked a series of questions regarding parent involvement and community collaboration. The researcher coded the data which revealed emerging themes including expectations, support, resources, barriers and access. Respondents indicated that they have the expectation for their children to be successful.

Interviewee One stated that they were a parent as well as a school administrator and a provider of STEM academic learning. He stated that parental involvement in any level should help the student be successful in response to Question Two, "Do you believe parental involvement is a significant factor in student achievement?" Interviewee Two responded in the inverse that a child is helped towards success when a parent

demonstrated interest in their child's personal achievement and failures. The theme of support was demonstrated in two distinct areas: Motivating, which is defined by the researcher is encouraging actions or attitudes display to one party for the intent of leading another party to a specific outcome of endeavor, as well as, Support, which is more explicit in action than Motivation, is coded as pushing my child in which a parent has not only the expectation of actions on part of their child but propels their child towards a specific outcome. Throughout the interviews stakeholders discussed the importance of resources and specific forms of resources they deemed positive. The first type of resource was the academic amenity of clubs which is defined by the researcher as extracurricular out-of-school time academic or social activities for youth. The second academic amenity coded as a resource theme is mentoring which is out of school time activities for use within a one on one or small group setting for the intent of raising the academic or social capacities of participating youth. Interviewee Four indicated that a young ladies' mentoring group emerged after their participation in the nonprofit program researched in the study. The interviewee stated in that due to this participation their child had a developed interest in STEM possibilities after high school. Interviewee Two indicated that the robotics club their child participated in relied upon the parents who initiated and led this activity are crucial in motivating their children to find solutions and to keep trying. Support and resources are intertwined to stakeholders' perception of their role in providing support which can result in outcomes related to their children participation in an academic amenity resource opportunity.

The stakeholders listed a series of barriers that limit parents from being actively involved in endeavors leading to their child's success, including lack of money, lack of time and inflexible work schedules. Conversely, respondents indicated a series of access opportunities to build networks for the purpose of raising student achievement. The researcher defines the coded theme of access as any means that encourage the development of parental involvement in their child's academic achievement.

The theme of access includes support, collaboration, presence, transportation and communication. Support was heavily repeated by the respondents as a feature of building strong parental networks. Interviewee Two responded that schools can foster the development of strong parental networks through organization execution support as well good communication. Respondent Four indicated that the ability of parents to work together on behalf of their children can be increased with additional support. Interviewee Five shared an example of parental support being a catalyst for the success of students. The respondent stated,

> Many of the students I encounter believe in themselves more when they know that there is an expectation of love and support from one or both parents. In my personal classroom, students whose parents are engaged and converse with staff about their children and show up for PTA conferences, emails etc., do far better than the peers who do not have that support behind them. (Personal communication, November 8, 2015)

This respondent articulated support as a parent's presence in their child's academic development demonstrated through communication between home and school and attendance at school functions.

The development of strong parental networks was an outcome of communication. Interviewee One indicated that the development of strong parental networks will be fostered by schools with communication, along with the provision of workspace and workshops for parents. Interviewee Two indicated that it takes a village in order for parents to support their ability to work together on behalf of their children and echoed Interviewee One's sentiment that communication is paramount for the development of strong parental networks. Interviewee Five stated that the resources and supports needed for parents to work together included websites, emails or texts or any correspondence that allows for a seamless and pronto response to ascertain optimal behavior grades from their child/students. Their responses informs that communication is a significant factor in building ties between members of the social network of a community and that schools can use social media and online tool for communication engagement between the school and home (see Table 12).

Table 12

Stakeholder Interview Outline and Definition of Themes

Data Codes Successful	Theme Expectations	Definition
		Positive outcomes as a result of work or effort applied to an endeavor
Motivating	Support	Encouraging actions or attitudes displayed to one party for the intent of leading another party to a specific outcome or endeavor.
Pushing My Child	Support	Explicit action on part of a parent to propel their child toward a specific outcome.
Clubs	Resources	Extracurricular out-of-school-time academic or social activities for youth.
Mentoring	Resources	Out-of-school time activities for youth within a one-one-one or small group setting for the intent of raising the academic and/or social capacities of participating youth.
Money	Barriers	Financial resources
Time	Barriers	Availability within the parents' daily schedule
Work	Barriers	Parents' employment
Support	Access	Aid to youth or parents which enables them to achieve intended outcomes

(continued)

Table 12 (continued)

Collaboration	Access	Support between stakeholders to achieve intended outcomes
Presence	Access	Parental physical contact and/or emotional connection with their children
Transportation	Access	Travel access to and/or from locations, including home and community academic amenity resources
Communication	Access	One and two-way contact between two or more parties

Analysis of the websites created on behalf of academic amenity providers who have participated in the nonprofit's STEM youth conference inform of a series of overlapping themes. Upon analysis, the researcher discovered that content, outcomes, strategies and support were emerging themes.

The themes included the following coded data terms STEM, an acronym, identified as science, technology, engineering, and mathematics content learning and STEAM, also an acronym, is identified as science, technology, engineering, art, and mathematics content learning. Analysis of the websites found that all of the academic amenity providers used these terms within their mission and/or vision statements and prominently displayed these terms on their website by repeated inclusion of these terms within their homepage and subpages. Some providers intertwined their programming to demonstrate that they were providing instruction in all four areas of STEM while others specifically focused on one or two areas such as Provider Nine, which was founded by a

professional with college training in biology. Provider Nine's programming, although listing STEM as a program focus in their homepage, did not showcase math, technology or engineering as feature core components of their programming. This was also true of Provider Eight which provides internships and mentoring for youth by offering training in technology. Provider Seven also focuses on one core area of the STEM. Akin to Provider Eight, they provide mentorship opportunities in one specific core area. This organization focuses on science with the subset of medical health training. Conversely, some of the providers offer programming opportunities in STEM across the four core content strands and create specific learning opportunities for each component. For example, Provider number Two lists programs based on specific learning including robotics, which is commonly partnered with engineering, and technology camps. Provider Three uses both text and images to show they engage their learners in an array of activities along the STEM spectrum. They showcase students engaging in hands-on chemistry which will be applicable to the science strand, Lego building which will be applicable to the engineering strand, and also indicate that they offer math and science enrichment utilizing NASA curriculum and impart technology through computer coding.

Across all of the academic amenity providers' websites, two outcomes were heavily repeated: student achievement and STEM career attainment. Provider Eight indicated that their core mission was to connect participants with jobs and they provide technology training. Provider Seven indicates that their goal is to create future leaders in the field of medicine and health care, while Provider Six indicated that they sought to cultivate a model for cradle to career in STEM education programming. Provider Four

includes a quote on their homepage which states that "Of the 20 fastest growing careers 15 of them require a background in STEM." Inclusion of this statement on their website implies that the programming they offer will support the youth participants' future in attaining careers in STEM. Provider Three also included a quote on their website which states that according to the United States Department of Education, studies have shown an early curiosity in various fields of study will increase student achievement in the classroom as well as offer a prospective career path.

Critical thinking was also listed on many of the websites and upon analysis the researcher has defined it as the ability to understand and analyze complex concepts and content. The last component of the theme of outcomes is empower which is defined as the means to motivate a person to feel capable of negotiating objectives. Therefore, the academic amenity providers have a two-prong purpose for their participants one academic in nature, critical thinking, and the other related to students socio-emotional development, empowerment.

Strategies for attaining goals include internships which provide students within programs training and direct supervision under an expert in the field to enable students' opportunities to acquire skills and knowledge related to STEM fields. These opportunities also provide for mentor relationships to be established between youth and a trusted adult for the purpose of the development of a youth's academic or social self. Many of the providers indicated that the instructional arc of their program was hands-on, which would provide participants cognitively mid to higher level range activities requiring problem solving based on inquiry based projects. This was evident in the

images as well as the text showcasing students working collaboratively to build robots or participate in science-based learning. Through the application of real-world problem-solving, participants further engaged in strategies which aid in their academic learning by making connections between the content and themselves.

Some providers also sought training educators in their practices as a strategy for a take me there organizations goals. Provider Ten is an organization which offers classroom educators opportunities to delve into heightened levels of instruction through on-site observations of their practices development of lesson planning and follow up support to hone best practices in STEM education.

To support the development of their programming organizations solicited participation from the community in the form partnerships which the researcher defined as established relationships between two entities for mutual benefit and volunteers to serve as recruited base of participants will impart their time talent and resources.

The researcher did note that none of the academic amenity providers who participated in the nonprofit's annual conference were parent-led initiatives. One such effort was being offered within the Polaris community and a website analysis indicated that parents rotated volunteer efforts throughout the year within one local elementary school. Training for this effort included YouTube guidance videos to provide overviews of the projects which were available for grade levels kindergarten to fifth grade. Supplemental training material included scripts parent volunteers would use to introduce and guide the one-period hands-on science sessions. Activities ranged from physical science, life science and earth science topics. The researcher did not locate any similar

parent-led academic efforts in the Octantis setting. See Appendix A for a website analysis of STEM Academic Amenity Providers and Appendix B for an outline/definition of Themes.

A survey was disseminated to a group of school educators and administrators who are members of a social media group for school leaders in the K-12 and postsecondary education setting. Membership in this group was voluntary and members self-identified without verification that they were administrators. The instrument data collection included responses by 14 educators, most of who indicated that they were administrators in their school setting. The respondents indicated that 35.7 affiliated with an elementary school, 35.7% indicated they were affiliated with the middle school, and 28.6% identified other as their school type. Few respondents identified their school site as having not many students qualified for free/reduced meals with the percentage rate of 7.1%; 50% of respondents indicated some, but not most just qualified for free or reduced meals while 42.9% indicated that most of their students qualified for free or reduced meals.

Demographically, most respondents were female with the percentage rate of 85.7% and male respondents reported at a rate of 14.3%. One in five respondents, 21.4%, indicated that they fell between the age ranges of 22 through 34, 57.1%, indicated that their age falls between the ages of 35 through 44 and the remainder respondents indicated that they were between the ages of 45 through 54, 21.4%. Most of the respondents, 85.7%, indicated that their role within their school as that of an administrator while 7.1% indicated that they were a teacher and 7.1% indicated that their role within their school was “other.”

This instrument was designed to capture the level of parental involvement occurring within the schools and the manner in which schools and parents interact. More than half of the respondents, 64.3%, indicated that few of their students have one or more family members who volunteer for at least one activity per year while 21.4% indicated that some of their students have one more family members who volunteer for a least one activity per year at 14.3% indicate that many of the students have one more family members who volunteer for at least one activity. None of the respondents indicated that nearly all of their students have one on more family members who volunteer for at least one activity per year.

Responses were evenly split between yes and no for parents receiving training to lead or serve as volunteers indicating that these opportunities offered and some settings but not in others. In most cases, 57.1% reporting parents are not self-initiating volunteer opportunities; however, some were 35.7% and just under 1 and 10 cases with 71% reporting that parents were initiating opportunities to form their own committees.
The survey instrument also captured the manner in which parents were informed of volunteer opportunities respondents were allowed to check multiple choices and indicated that 71.4% provided printed fliers or newspapers, 50% posted information on bulletin boards, 71.4% employed the usage of online social media text messages or emails, and 57.1% posted information onto their school's website. This aided in understanding that schools are utilizing technology as a communication tool to inform parents of opportunities to become involved in the school setting. The instrument further probed how parents are informed of out of school time learning opportunities. Respondents were

asked if their schools offer a directory or have other means of disseminating information. Approximately one in five respondents indicated that they have a print directory with 21.4% indicating that they do. None indicated that they have a directory posted online; 57.1% indicated that information is posted within the newsletter, while 42.9% indicated that they share this information on their website.

The research scope of study also extended into how partnerships between schools and communities led to student involvement and out-of-school time learning. Therefore, respondents were asked how many of their school partners offer OST learning opportunities: 92.9% indicated not many of their school partners offered these opportunities, while 7.1% indicated that some of their partners offer these learning opportunities.

To further understand the level of access for OST, the researcher asked each respondent how many other students participate in out of school time learning opportunities: 71.4% of respondents indicated not many, 21.4% indicated some, and 7.1% indicated that most of their students participated in OST learning. Perceptions of how STEM achievement intersected out-of-school academic learning were probed and overwhelmingly, 92.9% of respondents indicated positively that they believed that OST led students to achievement in STEM. However, there was a slight dip in the confidence of what OST offered learners: 85.7% indicated that they believed that OST's learning activities used effective strategies versus 14.3% believed that they did not.

Summary

The researcher's analysis of the data points to the need of increased collaboration between the members of the social network. Each revealed that they have the shared belief that student achievement is valuable and have demonstrated commitment through their dedication of time and resources to develop opportunities in activities which lead to student achievement. However, barriers for reaching this goal include an adequate lack of support between each member of the social network. School personnel do not perceive that their parents are highly involved participants, schools do not rely upon schools for more than information about opportunities and academic amenity providers are peripherally engaged in partnerships with school sites.

CHAPTER VI

FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Purpose of the study

The purpose of the study was to investigate the impact of social capital based on the relationships forged between stakeholders within a community and the resulting impact of these relationships on achievement. The setting of the study was a metropolitan Atlanta nonprofit and their community of partners, including schools and academic resource providers. The collection of survey instruments identified varied rules including excess to academic amenities, parent's background, instructional quality of academic amenities, students' academic extracurricular participation, community cohesiveness, racial identity, community values and expectations, parental involvement, and community resource acquisition. The independent variables were scaffold into two categories: demographic factors which included the racial identity and socioeconomic status constructs and parental back rent constructs present in each instrument. The second category of social capital factors included academic amenities, participation in activities until involvement, committee cohesiveness, community resource acquisition, community values, and expectations.

Research Methods

This qualitative research study employed a case study approach. Survey instruments that were posed to parental, school-based, and community member

stakeholders were administered to capture data as they related to how each member of the social network, community, engaged in activities as recipients, implementers or access channels to resources that support student achievement. To answer the studies research questions and investigate relationships between variables, the researcher coded data to record themes which emerged from analysis of documents and responses from surveys and interviews.

Findings

The following findings for each of the research questions within the study were informed by analysis of the data that is included within Chapter V.

Research Questions

RQ1: How does access to academic amenities impact student achievement?

Triangulation between the responses between the instruments completed by parents, school stakeholders, academic amenity providers and the members of the team who host an annual STEM youth conference indicate that access channels are narrow with few students engaging in the activity and communication from the school to the home being limited. Although social media and online websites and searches are being employed as a tool to communicate potential academic amenity offerings, partnerships, which provide a sustainable mutual relationship between schools and academic amenity providers are not being adequately fostered although parents are heavily reliant on the dissemination of information from the schools and would potentially benefit from a ratcheting up of partnerships and subsequent sharing of opportunities these partnerships would yield. All participants across the social network of community indicated that these

opportunities would lead to student achievement, and therefore, heightened access would further impact student achievement.

RQ2: How does the quality of instruction within academic amenity opportunities impact student achievement?

Participants of the academic amenities engage in a range of STEM-based activities to explore science, technology, engineering and mathematics content. The delivery of programming is often experiential with students engaging in small group, collaborative hands-on activities. However, the academic amenity providers within the study self-report that the complexity of the tasks their students engage in is often part of the lower ebbs of remembering, understanding and applying. Additionally, their students are not participating in activities aligned to the middle grade math content being taught in school. This is an indication that providers may not have an adequate awareness of how to build programming that integrates STEM content aligned to state learning standards.

RQ3: How does parent involvement impact student achievement?

The study's participants provided great insight into how Joyce Epstein's parental involvement typology is evident in schools. The school stakeholders indicate that most of their parent do not volunteer; however, one in four parents who participated in the study indicate that they commit to five or more hours of volunteer time per month and only twenty percent indicated that they do not volunteer at all at their child's school. Collectively, stakeholders have a strong belief that parental involvement impacts student achievement with parents indicating that their primary motivation for volunteering centers on their child's welfare and achievement or that of all children with the school

setting, 91.9%. School stakeholders on occasion offer training to their volunteer base and share these opportunities through social media and online platforms and the nonprofit's STEM youth conference facilitators all affirmatively responded that parental involvement is a significant factor in student achievement. In one case, student participation in an OST Stem activity piqued an interest in STEM and led to the involvement of the child and parent in further programming.

RQ4: How does community cohesiveness impact student achievement?

Community cohesiveness is a variable defined by the researcher as the extent to which members of the community are participants in activities that relate to school or civic initiatives, and feel that members within the community feel connected to the community's ideals and goals. This study posits that the community's ideals and goals which bind the individual stakeholder group together is their interest in further student achievement. Each actor within this cohesion plays a distinct role as recipient, developer or channel for academic amenity resources to reinforce student learning in STEM. The parent survey demonstrated that parents were willing to commit to parental involvement at school support their child and their peers on the school level but also showed a marked interest in involving their children outside of this environment in OST opportunities. As recipients within this dynamic, almost one-third took their children to the library, one in ten to a museum and one in twelve to a science/nature center based on responses from construct seventeen on the parental survey instrument. They further disclosed their commitment to the community's ideals of furthering student achievement by sourcing OST opportunities across the social network, including their child's school, friends and

neighbors and faith-based organizations. Of the parents who engage their children in OST opportunities, more than one-in-ten, 13.51%, do so with a STEM-related activity. Parents may not however deem the school helpful in engaging their child outside of the school environment as none, 0%, indicated that they rely on the school to help their child when their child needs assistance with school work. If they cannot assist their child directly, some seek out resources elsewhere, 14.7%.

Academic amenity stakeholders, whether for-profit or non-profit, seek to build channels between themselves and the school environment through the establishment of partnerships to recruit potential youth participants for their STEM programming. Their commitment to increasing STEM achievement is demonstrated by a willingness to engage in a range of activities, including the facilitation of STEM programming for the benefit of youth participants, as well as offering training to school's educators to further their knowledge base of STEM content.

Schools share information about OST opportunities with their parents using their websites and social media. On rare occasion, they also develop partnerships with academic amenity providers which can lead to student achievement. But on some occasion, 50%, they offer training to their parents to form a volunteer base, which could, if developed further, increase the level of participation in school initiatives.

Collectively, members within the community demonstrate a strong sense of cohesion around the intended goal of student achievement. However, by shoring up the channels existing between each part of the social network entity and developing support

mechanisms, such as training opportunities, increased community cohesion will be exhibited to impact student achievement.

RQ5: How does parental background impact student achievement?

Most of the respondents of this study were parents who self-reported that they attained some level of post-secondary education. They also self-reported that their children were high achieving, with most earning A's and B's in school, which indicated that parental background may be a factor in student achievement.

RQ6: How do community values and expectations impact student achievement?

Respondents to the survey instruments indicated that their community places value on student achievement. Members of the nonprofit's STEM youth conference membership committee responded consistently that parents who support their children and who are provided resources impact the success of children. Parents resoundingly responded that their community values student achievement and all stakeholders advocated the participation of students in OST offered by academic amenity providers are a vehicle to further student achievement.

RQ7: How does racial identity impact student achievement?

Most of the respondents of this study were parents who self-reported that they are African American. They also self-reported that their children were high achieving, with most earning A's and B's in school, which indicated that racial identity may be a factor in student achievement.

RQ8: How does socioeconomic status impact student achievement?

Most of the respondents of this study were parents who self-reported that they are middle-class earners with three-quarters, 76.4%, reporting annual earnings above $35,000. They also self-reported that their children were high achieving, with most earning A's and B's in school, which indicated that the socioeconomic background of parents may be a factor in student achievement.

RQ9: How does student extracurricular participation impact student achievement?

The researcher defines student extracurricular participation as the extent to which students are involved in learning activities outside of the school day which are correlated to core subjects taught in school. Parents responded that their children are engaged in some form of extracurricular activities, however, most students are engaged in sports while only a small fraction are participants in academic learning. Only 17.6% are engaged in academic tutoring and 14.7% are engaged in STEM OST opportunities.

RQ10: How does community finance acquisition impact student achievement?

Only about half of the parents within the social network believe that their community has adequate funding to provide resources to support student achievement for all of the children within their community. Nearly the same amount are in agreement that their community has the knowledge base to access additional funding through foundation or community giving programs to non-profit entities such as their local libraries. However, most of the academic amenity providers who participated in the study categorized their entity as a nonprofit that mostly supported the implementation of their program through a fee-based model. One-third of the respondents indicated that their

programming was over $25.00 per participant, per session. Analysis of the websites from the providers indicated that many have a commitment to reaching underrepresented populations in STEM. Only 16.7% of respondents indicate that they receive foundation or grant funding to support their programming School stakeholders responded that their school sites have few students who participate in OST and many of their children are qualified to receive free or reduced meals. Therefore, participation in OST which furthers student achievement may be a factor as to why their children are not involved in programming opportunities. Collectively, the analyzed data indicates since few students participate in OST opportunities which lead to student achievement and that access may be impeded due to the fee-based models used by academic amenity providers.

RQ11: How is parent involvement fostered to implement academic programming to impact student achievement?

School stakeholders indicated that half of the respondents offer training to their parent volunteers. This support, along with sharing possible opportunities to render service through school websites and social media, fosters the level of involvement on the part of parents. However, stakeholders also indicate that on rare occasion are these opportunities self-initiated by parents and therefore the level of decision-making and collaboration may be low.

RQ12: How is access and quality of academic amenity resources cultivated to impact student achievement?

Academic amenity providers seek to establish partnerships with local schools and, on some occasion, provide training opportunities to school personnel to increase the level

of STEM content knowledge and delivery. However, this was a one-way relationship since no provider indicated that they received support from their school partners to leverage their programming to benefit student achievement through training opportunities offered by the schools or provision of any other support mechanism. The quality of instruction imparted by academic amenity providers leaned toward lower level complexity questions and only on occasion had alignment with state standards in math.

Access to the opportunities was afforded by parent initiative to source OST offerings through their social network and through social media. The school was also highly instrumental in the sharing of information by posting opportunities on their website and social media as primary channels of communication. Parents indicated that they would be interested in social media networking with their school, and even more so, with their peers, 94.1%. However, very few accessed information regarding opportunities from this latter source, 8.8%, which is an indication that the schools would have to further develop social media channels between themselves and their parents or create secondary channels to foster information sharing between their parents.

Aside from information channels as an access point to participation in the services provided by academic amenity providers, the fee-based model is also a potential hazard which may be an impediment for student inclusion in student's academic extracurricular participation.

Implications

The findings within this report demonstrate the need for parents, academic amenity providers and school stakeholders to begin shoring up relationships between

each entity to further understand the role each plays in receiving, implementing and serving as an access channel to opportunities which lead to student achievement. As a result of the findings of this study, these three relationship channels and the ensuing roles and responsibilities of each entity within the social network has become apparent.

The role and responsibility of the parent, as a decision-maker in the home setting, is integral in ensuring that students attend and participate in student extracurricular academic activities. This study illuminates that Joyce Epstein's (Epstein & Sanders, 2002) Typology of Parental Involvement can be impeded by a lack of training. Although parents demonstrated an immense commitment to their children's success by engaging them in activities and volunteering in schools, the role of decision-maker in the school setting was lacking. Further, many indicated that their community had knowledge of funding sources to support the programming of nonprofit entities. However, the academic amenity providers involved in the study often did not receive such funding and instead employed a fee-based structure that would potentially become a barrier for participation for those without the financial means to pay.

According to researchers Epstein and Sanders (2002), parents as collaborators, based on Joyce Epstein's typology, would enable parents to identify and integrate community resources to support student development. To advance to this level of the hierarchy, parents would have to develop as parent-leaders who initiate activities and develop an awareness of potential resources, including funding and programming. At this juncture, parents are members of the network who are primarily recipients and would have to transition to advocate-leaders to impact student achievement to a greater degree.

Academic amenity providers are members of the social network who implement programming to support the academic learning experienced by students within the school setting. Their commitment to serving is evidenced by the programming activities they have designed which integrate one of or a combination of STEM: science, technology, engineering and mathematics. The narrative descriptions included within the body of their websites disclose an awareness of the importance to STEM as a vehicle for future postsecondary study and employment. That commitment is furthered by the development of opportunities to engage in mentorships, internships and teacher training opportunities which provide long-term impact to student and teacher stakeholders. Due to a lack of depth in the ability to provide quality instruction, opportunities to close academic achievement gaps are being potentially missed.

The role and responsibility of this member of the social network is the understanding and integration of standards and strategies which align with state standards and provide a critically thinking rich learning environment. As self-reported in the Academic Amenity Provider instrument, strategies employed within programming lean toward lower cognitively complex tasks. While engagement in academic learning outside of the school environment is helpful to support students' achievement, a lack of challenge as exhibited through activities calling for evaluation, analysis and synthesis will not aid on student progression toward mastery of content. Furthermore, many of the providers within the study self-reported that their programs' do not integrate state math standards. Although a separate strand within STEM, mathematics girds all of the strands.

As the primary access channel between the recipients and implementers of resources within the social network, the school has an important role in ensuring student success through the participation of students within OST opportunities. School stakeholders within the study indicated that many serve at schools in which their student body experiences a moderate to high rate of poverty, which is converse to the socioeconomic status of the parent participants within the study. They self-report that they serve as a vehicle to share out of school time opportunities with parents and deem these opportunities as a valuable contributors to student academic success. However, they are also grappling with low parental involvement, although they share opportunities for involvement within the social media platforms they use and their school websites. They also indicate that few of their students participate in OST, which presents a missed opportunity for students' reinforcement of skills and content introduced within the classroom. Additionally, they indicate that the partnerships which have been established between their schools and academic amenity providers.

As the access channel between parents and academic amenity providers, and based on their expertise in awareness of content and strategies aligned with state standards and student cognitive learning, the school has the added responsibility of not only furnishing parents with information regarding opportunities but with seeking out partnerships to foster additional access to opportunities. Through partnership, students would be served with additional supports not offered during the school day for HW completion and reinforcement of skills and content. The school can also serve as a staff

development support to ensure that the learning imparted coincides with the knowledge base students are expected to know to succeed academically.

Limitations of the Study

The researcher once lived within the vicinity of the setting and has two children who once attended area schools. The researcher has also supported the nonprofit entity within the study as a volunteer and subcontractor receiving payment for curriculum development and program development services.

The dependent variable, student achievement, and independent variables of race, socioeconomic status, and role within the school or academic amenity organization were all self-reported, and therefore may not be accurate. The instruments attempted to ascertain the extent in which SES impacted the dependent variable. The researcher did not include a follow up question to capture the household composition of each respondent to determine the per person income within each family. Doing so would further clarify how the overall household income was spread between small to larger households. Census data would contribute to clarifying this inconsistency to gauge stratified income levels.

The study captures data from a participant pool that discloses their perceptions on parental involvement, community relations and student achievement and may not be congruent with the broader community. The researcher did not capture the science portion for the academic amenity provider survey since this portion of the instrument was not uploaded online prior to the administration window for data collection. Further, data captured on Table 11 Assessment of Learning by Participants of Academic Amenity

Providers was a result of a typo which captured 20% of respondents selecting "Q" instead of the intended statement "Participants complete a performance evaluation at the end of the program," the fifth selection on the multiple select choice in the survey.

Recommendations

The researcher suggests the following recommendations for the three entities of the social network: parents, as recipients of services; academic amenity providers, as implementers of services; and, educational leaders, who provide an access channel between each of the aforementioned.

Recommendation for Parent Stakeholders

- Use pre-exiting social media channels, such as Facebook, Twitter and Instagram, to source and share opportunities between themselves and other parents.
- Engage in parental involvement activities which are self-initiated to raise the level of decision-making in the school setting.
- Participate, if offered, or request the development of, parent trainings to increase the capacity to serve as parent-leaders.
- Create channels between the school and academic amenity providers by identifying and integrating academic learning opportunities offered within the community.
- Involve children in extracurricular opportunities that are academically centered and in support of learning occurring within the school environment. Considering that parents have indicated that that learning impacts

achievement, increase the contact to academic learning outside of the school environment.

Recommendation for Academic Amenity Providers

- Establish partnerships with schools to further recruitment efforts and to extend opportunities for funding which may be available to schools through sources, such as Title 1.
- Raise the level of academic rigor by employing strategies which require students to stretch and reach cognitively.
- Align program activities with state content standards to support student development of knowledge that is introduced and taught at school.
- Offer opportunities to train parents and school personnel in STEM learning, and in return, find and seek opportunities to learn from the other members of the social network.
- Seek funding from foundations, with the help of the other members of the social network, to support programming that will increase the reach of participants who may qualify for free or reduced meals.

Recommendation for Educational Leaders

- Develop and implement parent training opportunities to increase parental involvement and to deepen the involvement of parents as decision makers and collaborators. These trainings may be structured as online or face-to-face experiences to include leadership skill set development to enable parents to

work collaboratively to initiate and implement learning opportunities for their children.

- Establish partnerships with academic amenities to foster student achievement by expanding opportunities for students to participate in OST.
- Provide online access to lesson plans and activities for use by fellow school programs since economically divergent communities have unequal access to academic resources.
- Increase the communication channel by using media that affords for two-way dialogue to ensure that information is shared and parental voice is encouraged. Use to create a grapevine communication between parents who can share these channels information with their fellow parents since data indicates that parents are more likely to engage with one another through social media then with school personnel.
- Support academic amenity providers by offering staff development that will raise their level of rigor and the alignment of standards.
- Educate parents, via social media channels, of tutoring and other OST opportunities to increase academic achievement.
- Create opportunities to develop a theory of change that enables all stakeholders to identify pre-exiting resources, potential short and long term activities and goals to lead to student achievement.
- Educational leaders seeking to expand on this research would benefit the broader community by including a more diverse respondent population to

ascertain the extent the SES and racial identity variables impact the dependent variable. Additionally, survey instruments should include a ‘check all that apply’ function to capture OST activity from parent respondents to ascertain a broader understanding of all activities students are engaging in outside of the school environment.

The data collected and analyzed within this case study indicates that several factors correlate with the extent student achievement is attained within varying populations. Families within lower socioeconomic settings experience fewer opportunities for student academic engagement outside of the school setting due in part to a less fluid communication channel between the home, school, and academic amenity environments, as well as fewer opportunities for parent driven initiatives to implement programming to impact student academic achievement and fewer access point to academic amenity resources which may be limited due to fee models imposed by profit and nonprofit youth OST programs. The existing parent-led program within the Polaris community can serve as a model to close the academic divide between economically divergent communities and schools.

APPENDIX A

Website Analysis of STEM Academic Amenity Provider

Provider	Content from Website
Provider – 01	The provider's logo located in the masthead indicates that the mission of the nonprofit organization is to navigate, motivate, and educate youth. Images of students ranging from the ages five through high school years of age show students engaging in robotics hands on collaborative stem projects and lectures within the classroom and workshop settings. Activities included the construction of structures using toothpicks and marshmallows and engagement in Lego robotics builds. Clothing in one image indicates that the group of youth participating in activities is a nationally recognized out of school time Organization. Within the missions subpage under the about us tab the organization indicates that their goal is to open the gifts of a child. Their vision statement indicates explicitly that their work is to aid in at-risk youth pursuing stem careers. Of the seven programs listed the program provides services through workshops camps tutoring in directly to court involved to youth. A contact page exist to interact with the provider however no registration links or PDF brochure is for upcoming camps of programming was evident on the website. Other communication opportunities with the provider include a link to their Facebook organization page which at the time of analysis included 168 likes any Facebook share button an appeal for participation on volunteer support was hyperlink to their contact us subpage. The provider's page also indicates through their plea for donations with levels ranging from 5000 to 50,000 and in-kind resources including robots kids' snacks for children and volunteer time that they are reliant upon the community to support their program endeavors. Keywords: STEM, Robotics, Empower, Inspire, Technology, Exposing
Provider – 02	Prominently displayed on the homepage of the provider's website is a graphical flyer for an upcoming stem event. The provider's workshop is divided between two youth age ranges the first ages six through eighth and the second ages nine through 14. The latter group included activities to engage a robotics and videogame making and the former group would engage in robotics and moviemaking. The page also includes a YouTube video displaying the students within their program engaging in Lego robotics completed by two white male participants elementary aged. Several sites throughout their local community were

Provider	Content from Website
Provider – 02	indicated as location for classes including a primary location and schools hours of operation or six days a week with the exception of Sundays and activities include Afterschool provided by a separate partnering organization birthday parties, First Lego League competition team field trips and technology camps. The about us tab links to an article from the company Pitsco, a technology Educational brand, that details the background of one of the cofounders. The article indicates that the cofounder has years of experience within the elementary and middle school setting as a teacher and begin their career with stem education by working part time initially teaching elementary engineering classes in an afterschool program. The article identifies the cofounder as a member of their advisory board. Keywords: S.T.E.A.M., enrichment, science, technology, engineering, art, math, problem-solving discovery, exploratory learning, critical thinking, hands-on, scientific design principles, aligned to S.T.E.A.M. standards
Provider – 03	The mission of the organization is to provide opportunities to succeed in academics leadership and life through innovative learning strategies to increase them futures. Target participants rate from elementary to high school students and images on the webpage so diverse children with the range of ages and ethnic backgrounds. The youth displayed within the images are adorned in lab coat and goggles in some cases in small groups or individually working with robotics kits designed by Lego or with chemistry base materials using beakers. Programs provided include math and science enrichment utilizing approved NASA curriculum coding using scratch and Alice programming languages to learn important mathematical computation ideas hands on Lego builds to create separate machines based on math and science concepts taught within national standards and hands-on labs utilizing the scientific method. A direct quote from the website, "According to the United States Department of Education studies have shown an early curiosity in various fields of study will increase student achievement in the classroom as well as offer a prospective career path." Programming ranges from $25 per person for three hour sessions for students in grades three through eight at a local university setting activities to include forensic science to solve my cases and $150 per student Multi session class with four sessions for a robotics and filmmaking program. Websites recruitment of potential new hires indicates the candidates with education in math and in science are preferred. Social media tabs include links to Facebook page Twitter page and Instagram page. Keywords: hands-on, real world problems, engaging, innovative, critical thinking exploratory activities summarizing analyzing scientific investigative inquiry stem math science
Provider – 04	A series of scrolling images show groups of students gathered in groups of five through six Laura through larger groups within a ballroom setting adults

Provider	Content from Website
	you know workshop larger setting high school age students in gauging in afterschool stem activities elementary aged girls. Quote on the homepage states "of the 20 fastest growing careers 15 of them require a background in stem" programs include science parties summer stem in enrichment camps after school stem clubs and Saturday workshops located on the campuses of middle and high schools and two local colleges. One college is a single gender historically black college university serving African-American males in the second site is a research university renowned for stem studies including nanotechnology. Under the about us tab the founder is described as a Mail with 15 years in stem teaching experience who founded and let an elementary first Lego league robotics team which was featured on CNN. A link to a CNN video is provided on the webpage. The founder was awarded teacher of the year in 2006 and to get a 2010 and employees arrange a versatile teaching methods as self-identified on the website as hands-on learning and engaging. The contact page provides a picker for three levels of engagement with the provider including enrollment in the program partnership the organization and sponsorship for the organization. Social media links include Twitter Facebook Instagram into YouTube videos label testimonials with participants providing insight into the programs impact. Keywords steam critical thinking innovative instruction creative minded hands-on proficient exposure understanding
Provider – 05	An image of a white male proximally 30 years of age in the foreground holding a reptile shows the providers local old van in the background. Several programming for school groups are listed batched by H including to program specifically for pre-kindergarten student one for kindergarten through second grade students one for third-grade fourth-grade students one for fifth grade students 1463 eighth-grade students and one for nine or 12th grade students. Programs include encounters with live animals in a discussion regarding different species and habitats. Career day talks with no animal encounters are also offered to discuss careers in the zoo including those of veterinarians, researchers and animal nutritionists. Price per session for the animal encounter programs is $360 for one session $475 for two sessions $590 for three sessions no animal encounter sessions are $50 for one hour with an additional $10 per hour up to five hours. Social media applications are available by clicking on a link on the Shearer page which leads to a sharethis.com specifically for this provider. Social media applications link to this page including Reddit, Digg, Facebook, Deliciu,s StumbleUpon, Twitter and LinkedIn. The page informs potential organizations that would like to book the provider for programs and parties the fees and content of programs.

Provider	Content from Website
	Keywords: train educator exciting life animals conservation science Festival's career day
Provider – 06	The mission of the organization includes securing 180 volunteers per scoop are cluster 50 committee partners per school district 36 musical community salsa gardens and 7000 youth and families impacted. The about us page indicates of the organization six to engage the community by developing infrastructure models to increase student achievement. The website includes A form search and a login for mentors in groups. The provider indicates that they engage with the community by showing how businesses and local resources can become partners to school districts engaging parents and the title I school setting. Cultivating a six model for cradle to career in stem education programming. Social media links include LinkedIn Tumblr google plus Pinterest Instagram Twitter with the 74 followers Facebook with 259 likes. Keywords: impact volunteers community partners college workforce authentic leaders stem science technology engineering mathematics reading achievement entrepreneurship
Provider – 07	The provider indicates that this is a national organization with 30 chapters, 26,468 Volunteer hours accrued, and an annual signature sold out youth health event. Scrolling images show a smattering of different herbs of people including in one image two bare chested toddlers with shorts on standing on a concrete floor in front of a brick wall adorned with Dane Mickey Mouse print blanket, two dozen people with diverse ethnic cities and age ranging from middle school young adults two adults holding up signs with the organization's name and logo and an emblem of an award from another organization. The logo of the organization indicates that their mission is to inspire selfless service through mentorship. Below the logo the provider indicates that their goal is to create future leaders in the field of medicine and health care through the youth of today and that the three pillars of success includes knowledge skills and attitude. Eight YouTube videos populate the homepage and hashtags to their annual events and are used to describe their upcoming events. The Facebook feed populates their homepage. The about us page includes a logic model with three categories of participants including mentees chapters and mentors through social networking with engagement across Facebook and Twitter platforms the providers website email and the hashtag of the organizations name. A newsletter sign-up link is also provided on their page #keywords: healthcare mentoring internship youth service medicine impact
Provider – 08	The mission of this organization is to put empower low income young adults to go from poverty to professional careers in a single year the goal is to close the opportunity divide by connecting participants with jobs by providing them with skills valuable to the economy. To secure economic self-sufficiency for their participants each a provided with internships as well as mentoring stipends and development of technology skills within the IT environment.

Provider	Content from Website
	Social media links include Twitter, LinkedIn, Facebook, YouTube, and Google +. A subscription to to the providers email is included along with a 501 C3 mom profit identifier in any report. Keywords: low-income, career, empower, skills, technology, IT, support, mentoring, motivation
Provider – 09	The mission of this organization is to provide learners the opportunity to engage in inquiry-based methodologies, experimental learning. Hands-on learning science programs include a single gender STEM fair specifically for girls, curriculum design for organizations and STEM 'adventures' for boys and girls. Activities for each of these programs is not explicitly listed more there any images into Katie what occurs within them. However the age range of participants spans from fourth-grade students to pre-med college students and educators of kindergarten through 12th grade youth. The founder of the program received awards for her instruction in biology. Her educational training background is in STEM and research and she possesses a college degree in biology. Keywords: Science, hands-on, biology, STEM, opportunity, experiential learning
Provider – 010	This provider is directly connected with one research university which specializes in nanotechnology. Their mission is to enhance them in schools had to revise systemic changes in STEM education specifically for underrepresented populations as well as to disseminate best practices to practitioners within the classroom setting. This organization directly there for partners with the university setting K-12 settings educational community groups and corporations. One major sponsor that is nationally recognized is listed on their website. Seven programs are included including a teacher educator partnership that is been operating for over 20 years it's revise professional learning a line to national state academic standards the goals of the program is to impact teacher affectedness to you did in the Cheeseman into did conduct in disseminate research focusing on teacher professional learning and best practices events include competitions, academic mentoring and STEM camps. Keywords interactive experiment exponential activities stem and a representation mentoring standards teacher effectiveness student achievement
Provider - 011	This nonprofit indicates that their goal is to expose students to the stem community provide critical thinking opportunities so used to the new cheese man and to also introduce students to create exploration in math and science. There to "programs listed on their website include the experimental design program in the math and science career Academy. The former teach students how to design and conduct experiments for math and science fairs by connecting youth participants to college students in science professionals for training this experience includes a written workbook supplement learning. The latter program is a hands on corrects will ration in which individual volunteers can engage students in a career day a series of stem exhibits occur through this program in various states across the United States and the experience is listed as an intersection a film writing and stem any three day

Provider	Content from Website
	workshop session, as well as, a two day festival with family friendly films arts and crafts filmmaking and storytelling. Keywords: real world applications, STEM, hands-on, science, engagement, filmmaking, experimental, student achievement, career, exploration, exposure, math

APPENDIX B

Outline and Definition of Themes from STEM Academic Amenity Provider Websites

STEM	Content	Science, technology, engineering and mathematics content learning
STEAM	Content	Science, technology, engineering, art, and mathematics content learning
Science	Content	Study of physical or natural world through observation or experiments
Technology	Content	Application of scientific knowledge
Engineering	Content	Study of the design and building of machines and structures
Mathematics	Content	Study of numbers and the relationship between numbers
Student Achievement	Outcomes	Success on classroom instruction as evidenced by students' report card grades and/or level of proficiency on state or national exams
STEM Career Attainment	Outcomes	Securing employment in STEM related fields
Critical Thinking	Outcomes	Ability to understand and analyze complex concepts and content
Empower	Outcomes	Motivating persons to feel capable of negotiating objectives
Internships	Strategies	Participation of youth in programming under the direct supervision of an expert in the field for the intent of the participant securing skills and knowledge related to the field
Mentorship	Strategies	An intentional established relationship between a youth and a trusted adult for the intent of increasing students' capacities academically and/or socially
Hands-On	Strategies	Participation in activities with manipulatives, including experiments and construction of models, for the purpose of exploration

Real World Applications	Strategies	Problem solving technique to heighten relevance by connecting academic learning to situations that may occur within the learner's environment or someone else's environment
Educator Training	Strategies	Preparation of educators with classes and interaction for the intent of raising student achievement
Partnerships	Support	Established relationships between two entities for mutual benefit.
Volunteers	Support	A recruited base of participants who impart their time, talent and resources to support an entity

APPENDIX C

Parent Survey

1. Your Gender:
   - ❍ Female
   - ❍ Male

2. Your Age:
   - ❍ 18-21
   - ❍ 22-34
   - ❍ 35-44
   - ❍ 45-54
   - ❍ 55-64
   - ❍ 65 and over

3. Your Ethnicity:
   - ❍ African American
   - ❍ Caucasian
   - ❍ Latino
   - ❍ Asian
   - ❍ Native American
   - ❍ Multiracial

4. Your Schooling:
   - ❍ As a child, I attended schools only in the United States.
   - ❍ As a child, I attended schools only outside of the United States.
   - ❍ As a child, I attended schools both inside and outside of the United States.
   - ❍ As a child, I did not attend school at all.

5. My Child(ren) is in grade (Check all that apply)
   - ❍ Kindergarten
   - ❍ 4th
   - ❍ 5th
   - ❍ 6th
   - ❍ 7th
   - ❍ 8th

6. Before my child(ren) entered kindergarten, they were primarily cared for during the day,
   - ❍ At home.
   - ❍ At a day care center.
   - ❍ Other.

7. When my child is completing HW or school projects/assignments, they mostly
   - ❍ Complete the work by themselves.
   - ❍ Complete the work with my help.
   - ❍ Other.

8. When my child(ren) needs assistance with school work, mostly
   - ❍ I can and do assist them.
   - ❍ I can sometimes assist them.
   - ❍ I find resources to help them.
   - ❍ I rely on my child's school to help them.
   - ❍ My child does not receive help.

9. What was your total household income before taxes during the past 12 months?
   - ❍ Less than $25,000
   - ❍ $25,000 to $34,999
   - ❍ $35,000 to $49,999
   - ❍ $50,000 to $74,999
   - ❍ $75,000 to $99,999
   - ❍ $100,000 to $149,999
   - ❍ $150,000 to $199,999
   - ❍ $200,000 or more

10. My child(ren's) current school grades are on average
    - ❍ A's
    - ❍ B's
    - ❍ C's
    - ❍ D's
    - ❍ F's

11. My highest level of schooling completed is
    - ❍ No schooling completed
    - ❍ Nursery school to 8th grade
    - ❍ Some high school, no diploma
    - ❍ High school graduate, diploma or the equivalent (for example: GED)
    - ❍ Some college credit, no degree
    - ❍ Trade/technical/vocational training
    - ❍ Associate degree
    - ❍ Bachelor's degree
    - ❍ Master's degree
    - ❍ Professional degree
    - ❍ Doctorate degree

12. My child(ren) participate in the following extracurricular activities
    - ❍ Service/civic organization
    - ❍ Academic tutoring
    - ❍ Mentoring
    - ❍ Arts, Visual
    - ❍ Language Studies (Latin, French, Korean, Chinese, Arabic, German, Other)
    - ❍ Arts, Performing (Drama, Dance and/or Music)
    - ❍ Sports
    - ❍ Technology, Computer Programming
    - ❍ Technology, Robotics or Engineering

13. I find activities to support my child's learning from the following resources
    - ❍ From my child(rens') school
    - ❍ From my local library
    - ❍ In the newspaper
    - ❍ From postings within the community, including stores
    - ❍ Social Agencies, DEFACS or other
    - ❍ Government Offices, Parks and Rec or other
    - ❍ Social Media, including Twitter, Facebook or Instagram

- ❍ Online from internet searched and websites
- ❍ From my church/faith-based organization
- ❍ From friends/neighbors
- ❍ Other

14. When I use social media, I use
    - ❍ Instagram
    - ❍ Twitter
    - ❍ YouTube
    - ❍ Facebook
    - ❍ Other: _____(Please Identify)
    - ❍ I do not use social media

15. I would be willing to use social media to connect to personnel at my child's school, including their teachers
    - ❍ Yes
    - ❍ No

16. I would be willing to use social media to connect to other parents and community members to share information about upcoming opportunities
    - ❍ Yes
    - ❍ No

17. In the past three months, my child(ren) participated/visited the following (Check all that apply)
    - ❍ Library
    - ❍ Bookstore
    - ❍ Music or Dance Studio
    - ❍ Museum
    - ❍ Nature/Science Center
    - ❍ Art Studio
    - ❍ Robotics Studio

18. I believe that student achievement is/includes: (Check all that apply.)
    - ❍ Critical Thinking
    - ❍ Problem Solving
    - ❍ Winning an Academic Achievement (Spelling Bee, Recognition for Honor Roll, or other)
    - ❍ Earning Honor Roll Status

- ❍ Earning a 'Met' Score on a Standardized Exam (CRCT or other)
- ❍ Earning an 'Exceed' Score on a Standardized Exam (CRCT or other)
- ❍ Making Positive Decisions
- ❍ Completing Assigned Work
- ❍ Engaging in Independent Learning Activities
- ❍ Helping Others through Service Learning
- ❍ Involves the Creation or Engagement in the Performing or Visual Arts

19. How often do you volunteer in your child's school?
    - ❍ More Than Five (5) Hours Per Month
    - ❍ Between 1 – 5 Hours Per Month
    - ❍ Not at All

20. How did you become involved in the last volunteer opportunity you participated in at your child's school?
    - ❍ I was personally asked by a teacher or other member of the school staff
    - ❍ I was asked by another parent
    - ❍ I responded to a printed flier or newsletter requesting volunteers
    - ❍ I responded to an online posting on the school's website requesting volunteers
    - ❍ I responded to a text message, email or social media post from the school requesting volunteers
    - ❍ I initiated involvement myself
    - ❍ None of the above

21. What is your primary motivation to volunteer at your child's school?
    - ❍ My child(rens) achievement and welfare increases when I volunteer
    - ❍ The achievement and welfare of all of the children in the school is important to me
    - ❍ Volunteering at my child's school makes me feel useful
    - ❍ Without my help, other parents would have to do all the work

22. I believe that the extracurricular activities my child(ren) are involved in help them achieve in school.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

23. I believe that my community values student achievement.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

24. I believe my community has the funding needed to provide resources to support student achievement for all children within my community.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

25. I believe my community knows how foundations and community giving programs help to provide additional funding to resources such as the library.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

26. I am satisfied with the quality of resources offered in my community that assist in my child's learning.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

27. I believe that my child's achievement in school can be improved with resources currently available in my community.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

28. I believe that my child's achievement in school can be improved by adding additional resources in my community.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

29. I am satisfied with the academic resources, including print, technology and programming/services, available at my local library to support my child's academic achievement.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

30. I believe community members can ensure academic resources to support student achievement are available.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

31. I believe that the learning which occurs outside of school impacts student achievement
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

32. I believe that STEM education is important for the future economy.
    - ❍ Strongly Agree
    - ❍ Agree
    - ❍ Neutral
    - ❍ Disagree
    - ❍ Strongly Disagree

33. Are there additional comments you would like to share?

END OF SURVEY

Thank you for your participation

APPENDIX D

Community Resource Provider Survey

PART ONE: OUR ORGANIZATIONAL PROFILE

1. Your organization type:
   - ❍ For Profit
   - ❍ Non Profit

2. Year Your Organization Was Established :
   - ❍ Within the Last 24 Months
   - ❍ Within the 3-5 Years
   - ❍ Over Five Years Ago

3. Your Gender:
   - ❍ Female
   - ❍ Male

4. Your Age:
   - ❍ 18-21
   - ❍ 22-34
   - ❍ 35-44
   - ❍ 45-54
   - ❍ 55-64
   - ❍ 65 and over

5. Your Ethnicity:
   - ❍ African American
   - ❍ Caucasian
   - ❍ Latino
   - ❍ Asian
   - ❍ Native American
   - ❍ Multiracial

6. Your Role within Your Organization: (Check all that apply.)
   - ❍ Founder, non profit
   - ❍ Owner, for profit
   - ❍ Executive Director
   - ❍ Lead Instructor
   - ❍ Other

7. Which of the following terms are included in your organization's mission or vision (Check all that apply.):
   - ❍ STEM
   - ❍ Science
   - ❍ Technology
   - ❍ Engineering
   - ❍ Mathematics
   - ❍ None of the above

8. What is the PRIMARY method of attracting program participants?
   - ❍ Through local school partnerships
   - ❍ Through print ads in local magazines or papers
   - ❍ Through online or social media marketing
   - ❍ Through referrals from past customers or a membership base
   - ❍ Through 'foot traffic'
   - ❍ Other

9. If social media is used, which of the following is used by your organization to engage with your stakeholders?
   - ❍ Instagram
   - ❍ Twitter
   - ❍ YouTube
   - ❍ Facebook
   - ❍ Other: _____(Please Identify)

10. If social media is used, how frequently does your organization post updates or communicate with stakeholders?
    - ❍ Daily
    - ❍ More than 1-2 times per week but not daily
    - ❍ Less than 1-2 times per week
    - ❍ 1-2 per month
    - ❍ Less than 1 time per month
    - ❍ Other: _____(Please Identify)

11. What is the MEDIAN AGE of program participants?
    - ❍ Under age 5
    - ❍ Between ages 5 through 8
    - ❍ Between ages 9 through 14
    - ❍ Over age 14

12. Does your program(s) involve a fee for participation?
    - ❍ Yes, paid by the participants
    - ❍ Yes, paid by a grant or other funding sources
    - ❍ No, fees are not charged for participation

13. What is the AVERAGE COST per participant, per session? (Cost is the fee charged to the participant or the amount budgeted in proposals and grants.)
    - ❍ Less than $5.00 per participant
    - ❍ Between $6.00 and $10.00 per participant
    - ❍ Between $10.00 and $25.00 per participant
    - ❍ Over $25.00 per participant

14. Which STEM content strands does your organization's program(s) include (check all that apply):
    - ❍ Computer Coding
    - ❍ Robotics
    - ❍ Engineering
    - ❍ Mathematics
    - ❍ Environmental Science
    - ❍ Physical Science
    - ❍ Chemistry
    - ❍ Biology

15. Are you a business partner with any of your local schools?
    - ❍ Yes
    - ❍ No

16. Have you provided professional development for teachers and/or staff at your local schools?
    - ❍ Yes
    - ❍ No

17. Has your local community, through grants or other funding streams, provided funding to support your STEM programming?
    - ❍ Yes
    - ❍ No

18. Do you believe STEM education is important for the future economy?
    - ❍ Yes
    - ❍ No

19. Do you believe STEM education needs to be given more support, including funding and resources?
    - ❍ Yes
    - ❍ No

20. Are there additional comments you would like to share?

PART TWO: OUR INSTRUCTIONAL PROGRAM

21. Does your program(s) involve the following strategies? (Check all that Apply)
    - ❍ Make a list of the main events.
    - ❍ Make a timeline of events.
    - ❍ Make a facts chart.
    - ❍ Cut out or draw pictures to show a particular event.
    - ❍ Illustrate what you think the main idea was.
    - ❍ Make a cartoon strip showing the sequence of events.
    - ❍ Write and perform a play based on the story.
    - ❍ Retell the story in your words.
    - ❍ Paint a picture of some aspect you like.
    - ❍ Write a summary report of an event.
    - ❍ Prepare a flow chart to illustrate the sequence of events.
    - ❍ Construct a model to demonstrate how it will work.
    - ❍ Make a diorama to illustrate an important event.
    - ❍ Make a scrapbook about the areas of study.
    - ❍ Make a map to include relevant information about an event.
    - ❍ Take a collection of photographs to demonstrate a particular point.
    - ❍ Make up a game using the ideas from the study area.
    - ❍ Make a three dimensional model of an item in the material.

- ❍ Design a questionnaire to gather information.
- ❍ Conduct an investigation to identify information to support a view.
- ❍ Make a flow chart to show the critical stages.
- ❍ Construct a graph to illustrate selected information.
- ❍ Make a family tree showing relationships.
- ❍ Write a biography.
- ❍ Create a new product.
- ❍ Invent a machine to do a specific task.
- ❍ Design a building to house characters you are studying.
- ❍ Create a new product.
- ❍ Give it a name and plan a marketing campaign.
- ❍ Write a blog entry in the voice or a person being studied.
- ❍ Write a TV show, play, puppet show, role play, or song about content being studied
- ❍ Design a record, book, or magazine cover for content being studied.
- ❍ Make up a new language code and write material using it.
- ❍ Create an app.
- ❍ Design a website or social media campaign.

22. Does your program(s) involve the following instructional **FOURTH** grade math outcomes? (Check all that apply.)
    - ❍ Use the four operations with whole numbers to solve problems.
    - ❍ Gain familiarity with factors and multiples.
    - ❍ Generate and analyze patterns.
    - ❍ Find all factor pairs for a whole number in the range 1-100.
    - ❍ Generalize place value understanding for multi-digit whole numbers
    - ❍ Use place value understanding and properties of operations to perform multi-digit arithmetic.
    - ❍ Extend understanding of fraction equivalence and ordering.
    - ❍ Build fractions from unit fractions.
    - ❍ Understand decimal notation for fractions, and compare decimal fractions.
    - ❍ Solve problems involving measurement and conversion of measurements.
    - ❍ Represent and interpret data.
    - ❍ Geometric measurement: understand concepts of angle and measure angles.
    - ❍ Draw and identify lines and angles, and classify shapes by properties of their lines and angles.
    - ❍ Our program **DOES NOT** involve any of the listed instructional FOURTH grade math outcomes.

23. Does your program(s) involve the following instructional **FIFTH** grade math outcomes? (Check all that apply.)
    - ❍ Write and interpret numerical expressions.
    - ❍ Analyze patterns and relationships.
    - ❍ Understand the place value system.
    - ❍ Perform operations with multi-digit whole numbers and with decimals to hundredths.
    - ❍ Use equivalent fractions as a strategy to add and subtract fractions.
    - ❍ Apply and extend previous understandings of multiplication and division.
    - ❍ Convert like measurement units within a given measurement system.
    - ❍ Represent and interpret data.
    - ❍ Geometric measurement: understand concepts of volume.
    - ❍ Graph points on the coordinate plane to solve real-world and mathematical problems.
    - ❍ Classify two-dimensional figures into categories based on their properties.
    - ❍ Our program **DOES NOT** involve any of the listed instructional FIFTH grade math outcomes.

24. Does your program(s) involve the following instructional SIXTH grade math outcomes? (Check all that apply.)
    - ❍ Understand ratio concepts and use ratio reasoning to solve problems.
    - ❍ Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
    - ❍ Compute fluently with multi-digit numbers and find common factors and multiples
    - ❍ Apply and extend previous understandings of numbers to the system of rational numbers.
    - ❍ Apply and extend previous understandings of arithmetic to algebraic expressions.
    - ❍ Reason about and solve one-variable equations and inequalities.
    - ❍ Represent and analyze quantitative relationships between dependent and independent variables.
    - ❍ Solve real-world and mathematical problems involving area, surface area, and volume.
    - ❍ Develop understanding of statistical variability.
    - ❍ Summarize and describe distributions.
    - ❍ Our program **DOES NOT** involve any of the listed instructional SIXTH grade math outcomes.

25. Does your program(s) involve the following instructional SEVENTH grade math outcomes? (Check all that apply.)
    - ❍ Analyze proportional relationships and use them to solve real-world and mathematical problems.
    - ❍ Apply and extend previous understandings of operations with fractions.
    - ❍ Use properties of operations to generate equivalent expressions.
    - ❍ Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
    - ❍ Draw construct, and describe geometrical figures and describe the relationships between them.
    - ❍ Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
    - ❍ Use random sampling to draw inferences about a population.
    - ❍ Draw informal comparative inferences about two populations.
    - ❍ Investigate chance processes and develop, use, and evaluate probability models.
    - ❍ Our program DOES NOT involve any of the listed instructional SEVENTH grade math outcomes.

26. Does your program(s) involve the following instructional EIGHTH grade math outcomes? (Check all that apply.)
    - ❍ Know that there are numbers that are not rational, and approximate them by rational numbers.
    - ❍ Expressions and Equations Work with radicals and integer exponents.
    - ❍ Understand the connections between proportional relationships, lines, and linear equations.
    - ❍ Analyze and solve linear equations and pairs of simultaneous linear equations.
    - ❍ Define, evaluate, and compare functions.
    - ❍ Use functions to model relationships between quantities.
    - ❍ Understand congruence and similarity using physical models, transparencies, or geometry software.
    - ❍ Understand and apply the Pythagorean Theorem.
    - ❍ Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
    - ❍ Investigate patterns of association in bivariate data.
    - ❍ Our program DOES NOT involve any of the listed instructional EIGHTH grade math outcomes.

27. Does your program(s) involve the following instructional FOURTH grade science outcomes? (Check all that apply.)
    - ❍ Students will describe the roles of organisms and the flow of energy within an ecosystem.

- ❍ Students will identify factors that affect the survival or extinction of organisms such as adaptation, variation of behaviors (hibernation) and external features (camouflage and protection).
- ❍ Students will demonstrate the relationship between the application of a force and the resulting change in position and motion on an object.
- ❍ Students will investigate the nature of light using tools such as mirrors, lenses, and prisms.
- ❍ Students will demonstrate how sound is produced by vibrating objects and how can be varied by changing the rate of vibration.
- ❍ Students will compare and contrast the physical attributes of stars, star patterns, and planets.
- ❍ Students will model the position and motion of the earth in the solar system and will explain the role of relative position and motion in determining sequence of the phases of the moon.
- ❍ Students will differentiate between the states of water and how they relate to the water cycle and weather.
- ❍ Students will analyze weather charts/maps and collect weather data to predict weather events and infer patterns and seasonal changes.
- ❍ Our program DOES NOT involve any of the listed instructional FOURTH grade science outcomes.

28. Does your program(s) involve the following instructional FIFTH grade science outcomes? (Check all that apply.)
    - ❍ Students will verify that an object is the sum of its parts.
    - ❍ Students will diagram and label parts of various cells (plant, animal, single-celled, multi-celled).
    - ❍ Students will relate how microorganisms benefit or harm larger organisms.
    - ❍ Students will question scientific claims and arguments effectively.
    - ❍ Students will verify that an object is the sum of its parts.
    - ❍ Students will explain the difference between a physical change and a chemical change.
    - ❍ Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.
    - ❍ Students will investigate the electricity, magnetism, and their relationship.
    - ❍ Students will recognize that offspring can resemble parents in inherited traits and learned behaviors.
    - ❍ Students will identify surface features of the Earth caused by constructive and destructive processes.
    - ❍ Our program DOES NOT involve any of the listed instructional FIFTH grade science outcomes.

29. Does your program(s) involve the following instructional SIXTH grade science outcomes? (Check all that apply.)
    - ❍ Students will investigate the scientific view of how the earth's surface is formed.
    - ❍ Students will recognize the significant role of water in earth processes.
    - ❍ Students will describe various sources of energy and with their uses and conservation.
    - ❍ Students will understand the effects of the relative positions of the earth, moon and sun.
    - ❍ Students will explore current scientific views of the universe and how those views evolved.
    - ❍ Students will understand how the distribution of land and oceans affects climate and weather.
    - ❍ Students will describe various sources of energy and with their uses and conservation.
    - ❍ Our program DOES NOT involve any of the listed instructional SIXTH grade science outcomes.

30. Does your program(s) involve the following instructional SEVENTH grade science outcomes? (Check all that apply.)
    - ❍ Students will describe the structure and function of cells, tissues, organs, and organ systems.
    - ❍ Students will examine the dependence of organisms on one another and their environments.
    - ❍ Students will examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offspring.
    - ❍ Students will recognize how biological traits are passed on to successive generations.
    - ❍ Students will investigate the diversity of living organisms and how they can be compared scientifically.
    - ❍ Students will examine the dependence of organisms on one another and their environments.
    - ❍ Students will describe the structure and function of cells, tissues, organs, and organ systems.
    - ❍ Our program DOES NOT involve any of the listed instructional SEVENTH grade science outcomes.

31. Does your program(s) involve the following instructional EIGHTH grade science outcomes? (Check all that apply.)
    - ❍ Students will examine the scientific view of the nature of matter.
    - ❍ Students will be familiar with the forms and transformations of energy.
    - ❍ Students will explore the wave nature of sound and electromagnetic radiation.

- ❍ Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.
- ❍ Students will investigate relationship between force, mass, and the motion of objects.
- ❍ Our program DOES NOT involve any of the listed instructional EIGHTH grade science outcomes.

32. How do you assess the learning of participants? (Check all that apply.)
    - ❍ Participants complete a written evaluation at the end of the program
    - ❍ Participants complete a written evaluation at the end of each session
    - ❍ Participants complete a performance evaluation at the end of the program
    - ❍ Participants complete a performance evaluation at the end of each session
    - ❍ Participants provide verbal feedback at the end of the program
    - ❍ Participants provide verbal feedback evaluation at the end of each session

END OF SURVEY

Thank you for your participation

APPENDIX E

School Stakeholder Survey

1. Your school type:
   - ❍ Elementary
   - ❍ Middle School

2. Describe the Socioeconomical Level of Your School :
   - ❍ Most Students Do Not Qualify for Free or Reduced Meals
   - ❍ Some, But Not Most Students Qualify for Free or Reduced Meals
   - ❍ Many Students Qualify for Free or Reduced Meals

3. Your Gender:
   - ❍ Female
   - ❍ Male

4. Your Age:
   - ❍ 18-21
   - ❍ 22-34
   - ❍ 35-44
   - ❍ 45-54
   - ❍ 55 and over

5. Your Role within Your School:
   - ❍ Administrator
   - ❍ Teacher
   - ❍ Other

6. What is the level of parental involvement within your school:
   - ❍ Nearly all of the students have one or more family members who volunteer for at least one activity per year (90 % or more)
   - ❍ Many of the students have one or more family members who volunteer for at least one activity per year (Between 50% and 89%)

- ❍ Some of the students have one or more family members who volunteer for at least one activity per year (Between 25% to 49%)
- ❍ A few of the students have one or more family members who volunteer for at least one activity per year (Less than 25%)

7. Do your parents receive training to lead or serve as volunteers?
   - ❍ Yes
   - ❍ No

8. Do your parents self-initiate volunteer opportunities?
   - ❍ Yes, they have initiated by forming their own committees
   - ❍ Yes, they have initiated by creating programming for student learning
   - ❍ Yes, they have initiated by identifying resources our school has or currently uses
   - ❍ Yes, Other
   - ❍ No, they do not self-initiate volunteer opportunities

9. How are parents informed of volunteer opportunities? (Check all that Apply)
   - ❍ We provide printed fliers or newsletter
   - ❍ We post opportunities on bulletin boards
   - ❍ We post information in an online social media source or send text messages or emails
   - ❍ Yes, we post information on our website

10. Does your school have a directory or other means of informing families of out-of-school-time learning opportunities? (Check all that Apply)
    - ❍ Yes, we have a directory, in print
    - ❍ Yes, we have a directory, on line
    - ❍ Yes, we post information in a newsletter
    - ❍ Yes, we post information on our website

11. How many of your school partners offer out-of-school-time learning opportunities?
    - ❍ Most (50% or More)
    - ❍ Some (Between 35 and 50%)
    - ❍ Not Many (Less Than 35%)

12. How many of your students participate in out-of-school-time learning opportunities?
    - ❍ Most (50% or More)
    - ❍ Some (Between 35 and 50%)
    - ❍ Not Many (Less Than 35%)

13. Do you believe students who engage in out-of-school academic learning activities experience higher STEM achievement?
    - ❍ Yes
    - ❍ No

14. Do you believe out-of-school academic learning activities use effective strategies to lead to higher STEM achievement?
    - ❍ Yes
    - ❍ No

APPENDIX F

Stakeholder Interview

1. I am a: (a) parent ☐ (b) school administrator ☐ (c) STEM Provider ☐

2. Do you believe parental involvement is a significant factor in student achievement? Please explain your answer.

3. Can you share an example of when parental involvement has created a success story for a specific student?

4. Can you share an example of when parental involvement has crated a success story for a group of students?

5. Which barriers, if any, cause parents to not be actively involved in their child's success?

6. What, if any, resources or supports, can aid parents to support their ability to work together on behalf of their children?

7. Do you believe some communities are more capable of working together than others? Please explain your answer.

8. How do you define parental involvement?

9. What are the top three features of a strong parental network?

10. How can schools foster the development of a strong parental network?

11. Do you believe time and attention should be given to extend STEM education outside of schools?

APPENDIX G

STEM Advisory Member Interview

1. How familiar were you with the other members of this group prior to the initial meeting?
2. How often do you participate in groups that develop programming or activities?
3. Do you believe your community is highly involved in activities to improve schools and the quality of life for families?
4. Do you believe your community has shared goals which positively impact student achievement?
5. Can you describe other instances in which you have participated in groups that develop programming or activities?
6. Why did you decide to join this group?
7. What is the purpose of this group?
8. Do you believe that the group fulfilled this purpose?
9. What worked well with the group working towards fulfilling its purpose?
10. What could have been improved to support this group fulfilling its purpose?
11. What are the three core characteristics of a leader?
12. Do you believe that most parents have these characteristics?
13. Do you believe these characteristics can be developed? If so, how?
14. How were families recruited?
15. What other strategies could have been used to recruit more families?
16. How were academic amenity providers recruited?

17. What other strategies could have been used to recruit more academic amenity providers?

18. How can social media be used in the recruitment of participants to join community groups or students to participate in programs?

19. Are there any barriers that would prevent the use of social media to connect community members, including parents, students, teachers and academic amenity providers?

20. Do you believe that members of the group felt comfortable working together? Describe any specific example to support your belief.

21. What do you believe schools can do to support the development of parents as leaders?

22. Do you believe parents in schools **LIKE** yours could develop a similar group to connect academic resources to students? Explain.

23. Do you believe parents in schools **UNLIKE** yours could develop a similar group to connect academic resources to students? Explain.

24. How can community groups can support student achievement in STEM can be achieved?

25. Is there any further insight you would like to share?

APPENDIX H

Document Analysis

1. Type of Document (check one)

☐ Newspaper	☐ Congressional Record	☐ Website
☐ Brochure	☐ Report	☐ Other
☐ Advertisement	☐ Press Release	
☐ Letter	☐ Census Report	
☐ Memorandum	☐ Lesson Plan	

2. Date of Document:
3. Title of Document:
4. Author(s) or Creator(s) of Document:

   Position/Title:
5. Intended audience of document:
6. Document Information:

   (a) Important content noted in the document:

   (b) Purpose for creation of the document:

   (c) Evidence to support purpose of the document's creation. (Quotes, if available):

REFERENCES

Balfanz, R., & Byrnes, V. (2006). Closing the mathematics achievement gap in high-poverty middle schools: Enablers and constraints. *Journal of Education for Students Placed at Risk, 11*(2), 143-159.

Briones, R. L., Kuch, B., Liu, B. F., & Jin, Y. (2011). Keeping up with the digital age: How the American Red Cross uses social media to build relationships. *Public Relations Review, 37*(1), 37-43.

Burke, M., Kraut, R., & Marlow, C. (2011, May). Social capital on Facebook: Differentiating uses and users. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 571-580). ACM.

Camara, W. J., & Schmidt, A. E. (1999). Group differences in standardized testing and social stratification. College Entrance Examination Board.

Cohen, D., & Hill, H. (2000). Instructional policy and classroom performance: The mathematics reform in California. The Teachers College Record, 102(2), 294-343.

Cohen, L., Manion, L., & Morrison, K. (2000). Research Methods in Education [5 th edn] London: Routledge Falmer. Teaching in Higher Education, 41.

Coleman, J. S. (1966). *Equality of educational opportunity*. Washington, DC: Department of Health, Education, and Welfare.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, S95-S120.

Common Core State Standards Initiative. (2014). Retrieved from www.corestandards.org

De Kock, A., Sleegers, P., & Voeten, M. J. (2004). New learning and the classification of learning environments in secondary education. *Review of Educational Research*, *74*(2), 141-170.

Desimone, L. (1999). Linking parent involvement with student achievement: Do race and income matter? *The Journal of Educational Research, 93*(1), 11-30.

Duffett, A., Johnson, J., Farkas, S., Kung, S., & Ott, A. (2004). *All work and no play? Listening to what kids and parents really want from out-of-school time*. New York, NY: Public Agenda.

Dutta, B.. & Jackson, M. O. (2003). *Networks and groups: Models of strategic formation*. Berlin: Springer Veilag.

Epstein, J. L., & Sanders, M. G. (2002). Family, school, and community partnerships. Handbook of Parenting. *Practical Issues in Parenting, 5*, 407-438.

Fasko Jr., D. (2003, April). *Case studies and methods in teaching and learning*. Paper presented at the Annual Meeting of the Society of Educators and Scholars, Louisville, KY.

Forehand, M. (2010). Bloom's taxonomy. *Emerging perspectives on learning, teaching, and technology*, 41-47.

Georgia Department of Education. (2014). *College and career ready performance index* (CCRPI). Retrieved from www.gadoe.org

Georgia Department of Education. (2012-2013). *Georgia charter schools annual report*. Retrieved from www.gadoe.org

Georgia Performance Standards (GPS). (2014). *Georgia standards*. Retrieved from www.georgiastandards.org

Gilbert, E., & Karahalios, K. (2009, April). Predicting tie strength with social media. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 211-220). New York, NY: Association for Computing Machinery.

Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory, 1*(1), 201-233.

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91*(3), 481-510.

Granovetter, M. (2005). The impact of social structure on economic outcomes. *Journal of Economic Perspectives, 19*(1), 33-50.

Grauerholz, L., & Bouma-Holtrop, S. (2003). Exploring critical sociological thinking. *Teaching Sociology, 9*(1), 15–29.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*(3), 255-274.

Hill, N. E., Castellino, D. R., Lansford, J. E., Nowlin, P., Dodge, K. A., Bates, J. E., & Pettit, G. S. (2004). Parent academic involvement as related to school behavior, achievement, and aspirations: Demographic variations across adolescence. *Child Development, 75*(5), 1491-1509.

Horvat, E. M., Weininger, E. B., & Lareau, A. (2003). From social ties to social capital: Class differences in the relations between schools and parent networks. *American Educational Research Journal, 40*(2), 319-351.

Huang, D., Cho, J., Mostafavi, S., Nam, H. H., Oh, C., Harven, A., & Leon, S. (2010). What works? Common practices in high functioning afterschool programs across the nation in math, reading, science, arts, technology, and homework--A study by the national partnership. The Afterschool Program Assessment Guide. [CRESST Report 768]. Los Angeles, CA: National Center for Research on Evaluation, Standards, and Student Testing (CRESST).

Kent, M. L., & Taylor, M. (1998). Building dialogic relationships through the world wide web. *Public Relations Review, 24*(3), 321-334.

Lareau, A. (2002). Invisible inequality: Social class and childrearing in black families and white families. *American Sociological Review, 67*(5), 747-776.

Lee, M. A., & Mather, M. (2008, June). Population bulletin: U.S. labor force trends. *Population Reference Bureau,* 63(62). Retrieved from http://www.prb.org/pdf08/63.2uslabor.pdf

Lelieveldt, H. (2004). Helping citizens help themselves neighborhood improvement programs and the impact of social networks, trust, and norms on neighborhood-oriented forms of participation. *Urban Affairs Review, 39*(5), 531-551.

Lin, N. (2001). *Social capital: A theory of social structure and action*. New York, NY: Cambridge University Press.

Lipman, M. (1988). Critical thinking: What can it be? *Analytic Teaching, 8,* 5-12.

Long, J. G. (2012). The perceived impact that tutors have on urban secondary students attending a community-based after-school program in the state of Texas (unpublished doctoral dissertation). Texas A & M University, College Station, TX.

Lu, J., Yao, J. E., & Yu, C. S. (2005). Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. *The Journal of Strategic Information Systems, 14*(3), 245-268.

Mangold, W. G.., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. *Business Horizons, 52*(4), 357-365.

Marin, L. M., & Halpern, D. F. (2011). Pedagogy for developing critical thinking in adolescents: Explicit instruction produces greatest gains. *Thinking Skills and Creativity, 6*(1), 1-13.

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). *Making sense of data-driven decision making in education: Evidence from recent RAND research*. Santa Monica, CA: RAND Corporation.

Nagle, B. T. (2013). *Out-of-school time program test scores impact for black children of single parents* (unpublished doctoral dissertation). The George Washington University, Washington, DC.

Olmstead, C. (2013). Using technology to increase parent involvement in schools. *TechTrends, 57*(6), 28-37.

Organization for Economic Co-operation and Development (OECD). (2014). *Results from the programme for international student assessment (PISA), 2012*. Retrieved from https://www/oecd.org/unitedstates/PISA-2-12-results-US.pdf

Perry, L., & McConney, A. (2010). Does the SES of the school matter? An examination of socioeconomic status and student achievement using PISA 2003. *The Teachers College Record, 112*(4), 7-8.

Portney, K. E., & Berry, J. M. (1997). Mobilizing minority communities social capital and participation in urban neighborhoods. *American Behavioral Scientist, 40*(5), 632-644.

Professional Standards Commission. (2014). *Certification rules*. Retrieved from www.gapsc.com

Programme for International Student Assessments (PISA). (2014). *PISA 2012 results: What students know and can do (Volume I, Revised Edition, February 2014): Student performance in mathematics, reading and science.* Retrieved from www.oecd.org.

Rogers, C., & Edelman, E. R. (2006). Pushing drug-eluting stents into uncharted territory simpler than you think - more complex than you imagine. *Circulation 113*(19), 2262-2265.

Sanders, M. E. (2008). Stem, Stem education, stemmania. *The Technology Teacher, 68*(4), 20-26.

Saxton, E., Burns, R., Holveck, S., Kelley, S., Prince, D., Rigelman, N., & Skinner, E. A. (2014). A common measurement system for K-12 STEM education: Adopting an

educational evaluation methodology that elevates theoretical foundations and systems thinking. *Studies in Educational Evaluation, 40*, 18-35.

Seddon, G. M. (1978). The properties of Bloom's taxonomy of educational objectives for the cognitive domain. *Review of Educational Research, 48*(2), 303-323.

Sielke, C. National Center for Education Statistics. *Georgia*. Retrieved from nces.ed.gov/edfin/pdf/ stfinance/georgia.pdf

STEM Georgia. (2014). *STEM program certification awarded by Georgia department of education.* Retrieved from www.stemgeorgia.com

Stronge, J. H., Ward, T. J., & Grant, L. W. (2011). What makes good teachers good? A cross-case analysis of the connection between teacher effectiveness and student achievement. *Journal of Teacher Education, 62*(4), 339-355.

Tagami, T., & Washington, W. (2013). *Metro Atlanta SAT scores tied to poverty*. Retrieved from http://www.myajc.com/news/news/local/metro-atlanta-sat-scores-tied-to-poverty/nbGny/

Technology Association of Georgia (TAG). (2014). *About TAG*. Retrieved from www.tagonline.org.

Theokas, C., & Bloch, M. (2006). Out-of-school time is critical for children: Who participates in programs. Washington, DC: Child Trends.

Thompson, B. C., Mazer, J. P., & Flood Grady, E. (2015). The changing nature of parent–teacher communication: Mode selection in the smartphone era. *Communication Education, 64*(2), 187-207.

Thompson, C. (2011). Critical thinking across the curriculum: Process over output. *International Journal of Humanities and Social Science, 1*(9), 1-7.

U.S. Department of Education, National Center for Education Statistics (NCES). *Program for International Student Assessment (PISA).* (2008). Retrieved from nces.ed.gov/surveys/pisa/pisa2012/pisa2012highlights_1.asp

U.S. Department of Education. (1998). *Turning around low-performing schools: A guide for state and local leaders*. Retrieved from www2.ed.gov/pubs/turning/strategy.html

Vygotsky, L. (1978). Interaction between learning and development. *Readings on the Development of Children, 23*(3), 29-36.

Xiang, R., Neville, J., & Rogati, M. (2010, April). Modeling relationship strength in online social networks. In *proceedings of the 19th international conference on the world wide web* (pp. 981-990). New York, NY: Association of Computing Machinery.

Zirkel, S. (2005). Ongoing issues of racial and ethnic stigma in education 50 years after Brown vs Board. *The Urban Review*, 37(2), 107-126.