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The Relationship Between Socio-Economic Status and the Frequency of School Web Page Access to Both Mobile and Non-Mobile Sites

Richmond Hughes Parker
University of Southern Mississippi

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The University of Southern Mississippi

THE RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS
AND THE FREQUENCY OF SCHOOL WEB PAGE ACCESS
TO BOTH MOBILE AND NON-MOBILE SITES

by

Richmond Hughes Parker

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

August 2013

ABSTRACT

THE RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS AND THE FREQUENCY OF SCHOOL WEB PAGE ACCESS TO BOTH MOBILE AND NON-MOBILE SITES

by Richmond Hughes Parker

August 2013

Research has shown that student performance increases when parents become more involved in their children's education, and the positive influence of parental involvement has been shown to persist across racial, gender, and socio-economic barriers (Miller, Adsit, & Miller, 2005). As a result, an increasing number of schools have sought to use the Internet as a tool to engage parents (Swann & Fenner, 2005). The purpose of this study was to examine the effectiveness of using the mobile web as a tool to help facilitate increased parental communication and involvement at the secondary level. It examined the relationship between socio-economic status, the availability of a mobile version of a school site, and the frequency with which users accessed school websites using the mobile web. The researcher also sought to investigate the extent to which school webmasters had up-to-date knowledge of both traditional and mobile web design.

While results from the study did not reveal a significant relationship between the socio-economic make-up of a school and the frequency with which stakeholders accessed either mobile or traditional school websites, an overwhelming majority of the correlations that were computed represented a large effect size. It seems possible that a larger sample size might have revealed a significant relationship. Results from the survey revealed that high school webmasters are generally knowledgeable about the principles of mobile web

design, but that they are dissatisfied with the amount of training that they received to help prepare them to serve in that capacity.

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A Dissertation
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for the Degree of Doctor of Philosophy

Approved:

Rose McNeese
Director

J.T. Johnson

David Lee

Michael Ward

Susan A. Siltanen
Dean of the Graduate School

August 2013

DEDICATION

This work is dedicated to my father, Dr. Don Parker. He completed his doctoral dissertation the month I was born, and while his degree is not in the field of education he remains the single most influential teacher that I have ever had. He has touched countless lives over the years, and like so many others before me, I am grateful to him for his example. His entire life has been a master class in what it truly means to be a good and an honorable man. I am so very proud that I am also able to call him my best friend.

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I would like to thank my wife Tanya for the support that she gave me during this process. She was an incredible source of strength, and her ongoing encouragement helped to ensure that I never lost sight of the big picture. She also did an amazing job of helping me to get through the more tedious tasks that an undertaking like this must necessarily entail. This endeavor simply would not have been possible without her constant support and her endless patience. I love her with all my heart, and I am truly blessed to have her in my life.

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CHAPTER I

INTRODUCTION

As the Internet has grown in popularity, most schools and districts throughout the country have established websites to help facilitate stakeholder communication (Swann & Fenner, 2005). While this desire for increased accessibility has many benefits, there is no doubt that the Internet's real appeal to educators lies in its potential to positively impact student achievement. Research clearly indicates that student performance increases when parents become more involved in their children's education (Miller et al., 2005).

Indeed, numerous researchers have demonstrated the impact that parental involvement can have on student performance (Epstein, 2010; Henderson, Mapp, Johnson, & Davies, 2007). Research has shown that its positive influence persists across racial, gender, and socio-economic barriers to touch students from a wide variety of backgrounds and circumstances. If school leaders can learn to use technology as a tool that may help to promote parent involvement, the benefits for student achievement may prove to be significant.

The most up-to-date information on how Americans are using the Internet only serves to underscore the importance of the unique opportunity presented by this new form of technology. The Federal Communications Commission (FCC) (2011) recently released a report showing that more Americans are now online than ever before. Over the last decade, the number of residential Internet connections grew at a rate of 31% per year, increasing from 5 million in December of 2000 to 77 million in December of 2010. Furthermore, users are more frequently accessing data using high speed connections; the report indicated that the number of Internet connections in excess of 200 kilobits per

second grew by 28% in 2010 alone. Another report from the Pew Research Center (Rainie, 2010) painted a similar picture; it showed that the percentage of Americans who reported using the Internet at least occasionally rose from 50% in September 2000 to 77% in September 2009 (Rainie, 2010).

Statistics focusing on the use of the mobile web lend even more weight to the argument that the Internet is an increasingly popular and viable form of communication. The FCC also highlighted an exceptionally high rate of growth in the number of people with mobile Internet subscriptions (FCC, 2011). By the end of 2010, that number had grown to a total of 84 million subscribers, representing a 63% increase over the previous year. Smith (2010) indicated that 40% of adults reported using their cell phone to access the Internet, e-mail, or send text messages; this represented a 32% increase in the number of people who did so during the previous year. As educational leaders seek to establish meaningful and worthwhile relationships with 21st century stakeholders, available research would seem to suggest that their efforts should include serious consideration of the opportunities that are presented by this growing trend in online connectivity.

Statement of the Problem

Leading technology experts seem to agree that the use of the Internet represents a powerful tool in the school's quest for increased stakeholder communication (Anderson & Rainie, 2010; Bouffard, 2006; Dardenne, 2010; Grujanac, 2011). Current usage data suggest that the mobile web represents an even more powerful medium that will allow school leaders to connect with those students and families who are most at-risk. Research from the Pew Research Center (Rainie, 2010) appeared to reinforce these findings. In one study, researchers found that African Americans and Latinos are

increasingly more likely to be cell phone users than are White Americans (Rainie, 2010). When the report was published, only 80% of White Americans were cell phone owners, compared with 87% of both African Americans and Latinos. African Americans and Latinos were also more likely to use their cell phones to access the Internet, with 33% of Whites reporting that they had accessed the Internet using a cell phone, compared with 46% of African Americans and 51% of Latinos. The trend was even more pronounced when researchers asked about the use of text messaging as a means of communication. While only 68% of Whites had used their cell phone to send text messages, 79% of African Americans had done so, along with 83% of Latinos who were surveyed (Rainie, 2010).

Research by Rainie and Keeter (2006) further emphasized the growing reliance on text messaging. They reported that 34% of non-Whites felt they would have difficulty communicating without the use of their cell phone, compared with only 24% of Whites. Researchers have found time and again that mobile communications technology is an effective means of communication that reaches across both racial and socio-economic boundaries (Crisp, 2009; Seal, 2011)

The Federal Government clearly recognized the importance of effective communication with the passage of the No Child Left Behind Act (NCLB) (Epstein, 2004; Epstein, 2005; U.S. Department of Education, 2002; U.S. Department of Education 2004). While the NCLB legislation included clear mandates for increased communication between parents and schools, the unfortunate reality is that most states continue to struggle in their efforts to comply. A monitoring report from the U.S. Department of Education (2008) pointed out that "...states were weakest overall in

compliance with the indicators for instructional support, especially with regard to parental involvement...” (p. 10).

Moles (2008) acknowledged the importance of NCLB requirements for parent communication, but noted “...Title 1 requirements do not cover all schools and are a federal mandate rather than one originating with the states” (p. 1). Moles went on to examine the extent to which individual states had passed legislation calling for an increase in parental communication on the part of schools. Of the 21 states that Moles (2008) surveyed, only five had rules in place that called for more action than was mandated by NCLB. A more far-reaching study by the National Parent-Teacher Association found that while a majority of states had enacted laws calling for family engagement, there was wide variation in the substance of these laws (Belway, Durán, & Spielberg, 2009). There is clearly room for improvement when it comes to promoting the kind of parental involvement that has been linked to increased academic performance.

Instead of embracing the kinds of emerging mobile technology that would seem tailor-made for such a task, there is evidence to suggest that an alarming number of educators tend to regard modern cell phones as nothing more than a threat to the traditional learning environment (Allen, 2012; Lenhart, Ling, Campbell, & Purcell, 2010; Sternberg, Kaplan, & Borck, 2007; Wei & Wang, 2010). This current position would seem to be untenable when a majority of the available data indicate that modern cell phone technology is an increasingly popular form of communication. The time has come for schools to re-examine the manner in which they approach the use of the most modern forms technology in their efforts to increase meaningful stakeholder communication.

Purpose of the Study

While there is no lack of research on the use of technology as a tool to promote parent communication, almost none of the extant literature has sought to examine the degree to which schools are able to effectively use the data capabilities of modern cell phones as a tool to promote and facilitate increased parental involvement. Researchers focusing on the use of the Internet as a communications tool have done so in a variety of ways; some have attempted to identify individual design elements that contribute to an effective school web site, while others have worked to create assessment instruments that rank school websites in order of effectiveness (Algozzine, Friedman, Hartshorne, & Isibor, 2006; Miller et al., 2005). A variety of studies have also provided specific data on the manner in which both parents and schools connect with each other online (Bouffard, 2006, 2008; Dardenne, 2010; Simon, Graziano, & Lenhart, 2001).

To the extent to which researchers have moved beyond this focus on the Internet as a broad topic, some have sought to examine more specific ways in which technology can help to enhance communication. There are some studies, for example, which have examined the way in which teachers use e-mail to communicate with parents, (Fuchs, 2004; Kilgore, 2010; Reed, 2008; Thompson, 2008). Other studies have looked at the use of text messaging in the educational setting (Crisp, 2009; DeVoe, 2008; Seal, 2011). Some researchers have even included the use of voicemail as a tool that can help to further the school-home relationship (Grujanac, 2011; Koch, 2010; Wood, 2009). The use of the cell phone to connect to online content is still a relatively new concept, however, and this has meant that there is almost no research which has focused

specifically on the use of the mobile web as a means of promoting increased parental communication.

This study represents an effort to bridge the existing gap; its purpose was to determine whether or not there exists a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access that school's web site. A further goal of the study was to examine the effectiveness of implementing a mobile version of a website in order to make the content accessible to a wider audience. The study also sought to examine high school webmasters' knowledge of web design.

Research Questions

The study seeks to provide school leaders with information about the degree to which stakeholders access school sites using the mobile web. It examines the relationship between the availability of a mobile version of a school site and the frequency with which users access that site using the mobile web. It goes on to investigate the extent to which school webmasters have up-to-date knowledge of both traditional and mobile web design. The following research questions helped to guide the study:

1. Is there a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's website?
2. Does the availability of a mobile version of a website significantly increase the frequency with which that site is accessed?

3. To what extent are current high school webmasters knowledgeable about the design of mobile websites?

Definition of Terms

It is important that readers have a clear understanding of the way in which certain terms are used throughout the course of this work. To that end, the following list of definitions is provided.

GATC. Google Analytics Tracking Code (GATC) refers to the programming code used by Google to provide webmasters with detailed information about the visitors to a specified website. The code is actually a block of JavaScript that can be inserted into the HTML header of a site. While it does not visibly change the appearance of the page, once in place the code collects information from both the browser and from the computer of each unique visitor. This information is then transferred to Google's servers, where it can be accessed using an online dashboard (Google, 2012a).

High Speed Connection. A high speed Internet connection is defined as a connection that allows users to send and receive information on the web at a speed of at least 200 kilobits per second (FCC, 2011).

HTML. Hyper Text Markup Language (HTML) is the underlying language, or code, in which all pages on the Internet are written. First introduced in 1990 by Tim Berners-Lee, the protocol was developed as a means through which multiple users could easily connect their computers to multiple other databases (Marco, 2011).

Internet. The Internet is a technological infrastructure that allows for two-way communication between computers across both time and space (Constantino, 2003).

JavaScript. JavaScript is a programming language developed by Netscape in the 1990's and aimed at users with little or no computer programming skills (Marco, 2011).

Mobile Web User. A mobile web user is a user who accesses content on the Internet through the use of a tablet, cell phone, or other mobile Internet-connected device (Smith, 2010).

Operating System. An operating system is a software program that serves two main purposes; it manages the functioning of all the hardware processes in a computer and provides end-users with a convenient interface that allows them to develop and run other computer applications (Haldar & Aravind, 2010).

Parent Involvement. The most widely-accepted definition of parent involvement comes from the work of Epstein (1995), who defines it as communication between parents and the faculty and staff of a school.

Smart Phone. The term smart phone refers to a cell phone that provides users with functionality similar to that of a computer and with wireless access to the Internet (Angle, 2010).

Short Message Service. Short message service (SMS) refers to text messages sent between modern cell phones (Hillebrand, Trosby, Holley, & Harris, 2010).

Visit. Google (2012b) defines a visit as the number of individual browsing sessions initiated by all visitors to a website being tracked via the Google Analytics tracking code. If visitors to the site being tracked remain inactive for more than 30 minutes, any future activity on the part of that user is counted as part of a new visit. Any

activity by users who leave the website but return within 30 minutes is attributed to the original browsing session.

Web Browser. A web browser is a software application that assembles HTML into a web page that contains specific elements such as graphical layout, font, or background color (Fox, 2008).

Webmaster. The person who is responsible for creating, updating, and troubleshooting a page made available on the Internet is known as a webmaster (Tubin & Klein, 2007).

Web Page. A web page is a single HTML file accessed via the Internet (Stauffer, 2003).

Website. The term website refers to a collection of multiple webpages that each presents users with unique content (Tubin & Klein, 2007).

Delimitations

This study was delimited to a total of 16 high schools located within a single school district in the southeastern United States. While the school district that was studied includes a total of 115 schools, the researcher chose to limit the scope of this study; research indicates that there exist distinct patterns which serve to differentiate both the type and amount of communication that occurs at the elementary, middle, and high school levels. The survey that was administered as part of this research was distributed to webmasters at 10 different high schools within the school district. Five schools were omitted from the survey because the district limited the scope of the study, and an additional school was omitted from the survey because it was the school at which the

researcher was employed; that school was omitted because the researcher's duties included the design and upkeep of that school's website.

Assumptions

Throughout the course of the study, the researcher was guided by certain assumptions. The researcher presumed that:

1. The tracking code provided by Google Analytics worked in the manner that has been described, collecting accurate and reliable data about the visitors to each of the school websites being studied.
2. The data provided by the Georgia Department of Education were reported with accuracy and reliability.
3. The expert assisting with the creation of the survey responded to the questions openly and honestly.
4. All of the respondents to the survey answered with honesty and without reservation.

Justification

There are countless factors which may influence the perceived effectiveness of a school website. From the design elements included on each page, to the hardware upon which the site is viewed, research has shown that those schools seeking to use the web to help increase parent communication and engagement must pay attention to even the smallest of details (Miller et al., 2005). In spite of the importance of these details, there is very little research on the specific ways in which stakeholders access content on educational websites. This study represents an effort to examine the effectiveness of

using the mobile web as a tool to help facilitate increased parental communication and involvement at the secondary level.

Summary

In this chapter of the document, the researcher has discussed the fact that there is overwhelming evidence to suggest a direct link between increased parental involvement and academic success. The researcher has also argued that this nexus presents modern educators with a unique opportunity to impact students by helping to promote increased levels of parental involvement. As more and more Americans make use of both the cell phone and the Internet, the most effective school leaders will seek out ways to harness the power of these new technologies. If they are to be successful in their efforts, researchers must address the current dearth of research on the most effective ways to do so. This study represents a step in that direction. In the next chapter of the study, the researcher will examine the existing literature on the use of technology as it relates to parental involvement in education. The researcher will then examine the way in which the mobile web might best be used to help promote a more meaningful relationship with parents of secondary school students.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter serves to provide the reader with an overview of the available literature on the link between parental involvement and student achievement, the effectiveness of using technology to increase parental involvement in the school, and the degree to which schools are keeping up with advances in more modern forms of technology as a means of facilitating communication with parents. The researcher described the theoretical framework that guided the study and provided readers with an understanding of the unique roles played by family, schools, and the community at large as described in Epstein's model of overlapping spheres of influence. Additionally, the researcher examined the evolution of each of these roles over time, paying careful attention to those functions of the school that facilitate increased parental involvement in the educational process; discussed the link between increased parental involvement and academic success, including the effects of both socio-economic background and race; and described some of the most common barriers to parental involvement to provide the reader a general understanding of the ways in which educators have incorporated different forms of technology into their ongoing efforts to increase parental involvement in the school. This discussion of the impact of technology on education will ultimately focus on more modern forms of electronic communication, including the school website and the use of cell phones and the mobile web. This review of literature will examine possible links between the use of technology as means of communication and the socio-economic and racial make-up of a school.

Theoretical Framework

As educators go about the work of creating successful relationships with families, a theoretical framework that helps to make sense of the complex nature of the link between the school and the family can serve as a structured guide. To that end, the work of Epstein (2010), referred to as *overlapping spheres of influence*, provides a useful model for parental involvement, particularly in current settings as it represents an important departure from more traditional perspectives on the relationship between the family and the school.

Epstein (2010) explained that researchers have traditionally sought to describe this relationship in terms of the goals and responsibilities of both the school and the family. While many early researchers focused on the separate (and often incompatible) responsibilities of the school and the family, a subsequent and opposing school of thought sought to explain the relationship in terms of the responsibilities that the two have in common. Epstein developed a third perspective that examines the issue in terms of *sequential responsibilities*. This last point of view recognized the fact that parents and schools frequently have different goals and responsibilities at different points during a child's life (Epstein, 2010).

Epstein (1995) argued that all three perspectives ultimately fall short of providing a model that can be useful to researchers, suggesting that "...the existing theories omit attention to history, student development, and the influence families and schools have on each other" (p. 28). In an effort to remedy the situation, Epstein's (1995) model introduced the idea of overlapping spheres of influence representing the school, the family, and the community. For this model, the student rests in the middle of Epstein's

overlapping spheres and is influenced by each of them to a greater or lesser degree, as can be seen in Figure 1. Epstein explained that a variety of factors can have an effect on the separation and overlap of the spheres, from the age of the child to the level or type of school and the historical time period in which the student is enrolled in school.

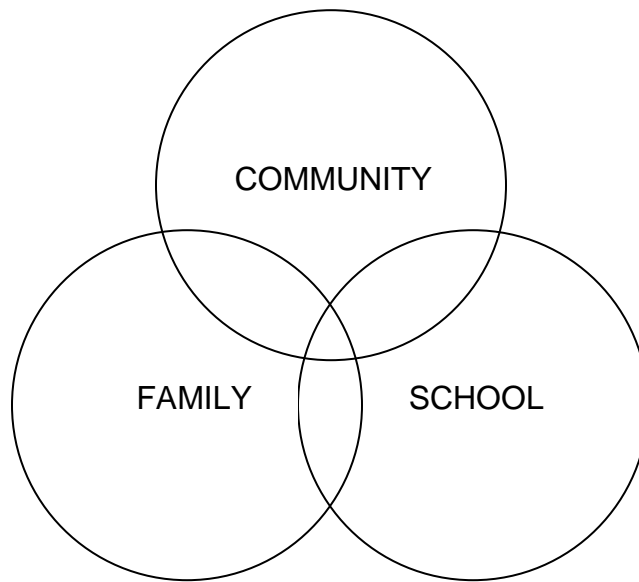


Figure 1. Epstein's Model of Overlapping Spheres of Influence. Adapted from (Epstein, 2010).

The utility of Epstein's (2010) model was immediately apparent, for it allowed researchers to look at the relationship between parents, the community, and the family from an entirely different point of view. This unique perspective facilitated the examination of a wider range of issues than had previously been impossible. Indeed, Epstein's model appears flexible enough to accommodate a tremendous amount of variation in the ways in which these three entities interact with each other over time. The placement of the spheres can be easily adjusted to account for parents who become less involved with the school as their children grow older, for example. Their placement

might likewise be modified to accurately reflect the changes that take place as a child moves from one school to another or from one teacher to another. The model can even be fine-tuned to accommodate for broader societal changes, allowing researchers to account for the historic increase in the number of working parents, or for the growing number of mothers who have gone on to attend college.

Epstein (2010) further described a framework consisting of six types of involvement that could occur among the three overlapping domains of school, home, and family (Epstein, 1995). The six types of involvement include:

1. *Type 1 – Parenting.* Helping families with parenting skills so that they are able to create the type of home environment that is most supportive to learning;
2. *Type 2 – Communicating.* Communicating with families about school programs and about their children’s academic progress;
3. *Type 3 – Volunteering.* Working to actively involve parents in volunteer opportunities at the school;
4. *Type 4 – Learning at Home.* Supporting families in their efforts to help their children with their homework and with other learning activities while they are at home;
5. *Type 5 – Decision Making.* Including families in the decisions that are made at the school and working to foster parent leaders; and
6. *Type 6 – Collaborating with the Community.* Identifying community services and resources that can be used to help support school programs.

This framework is an important part of Epstein’s theory as it provides school leaders with concrete ways they may involve stakeholders—families and communities, in their schools.

Deslandes, Royer, Turcotte, and Bertrand (1997) recognized the importance of Epstein’s (2010) model and modified it to focus on the effect that parenting style and parental involvement could have on secondary school students. Figure 2 shows the modified version of the overlapping spheres model that includes only two overlapping circles representing the school and the parents. This model suggested that the level of collaboration between the family and the school influences the impact of parenting style and parent involvement on student achievement in school.

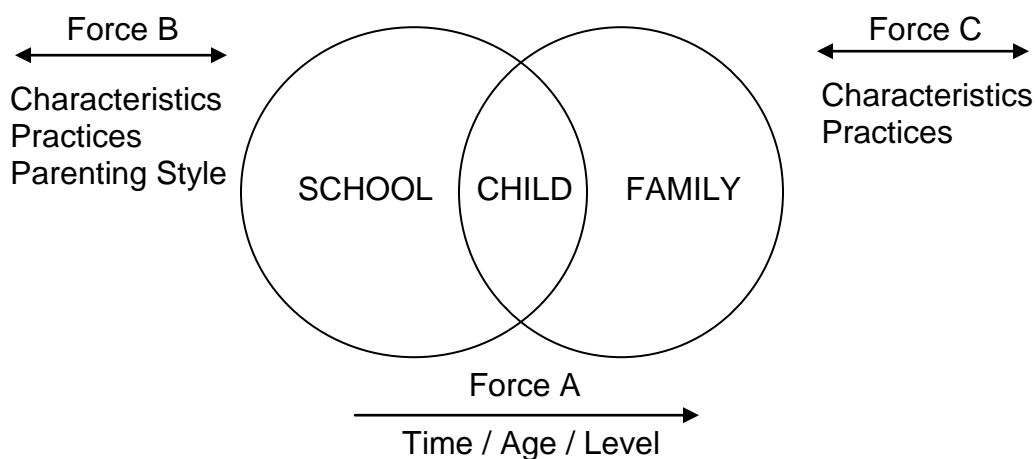


Figure 2. Modified Model of Overlapping Spheres of Influence. Adapted from Deslandes et al., 1997).

In the modified version of the Epstein’s model, three major forces influence the degree to which the circles overlap. Those forces are:

1. *Force A* – the age and grade level of the student and the social context during the time period that the child is enrolled in school;

2. *Force B* – the actions of the family which include parenting style and involvement in the school; and
3. *Force C* – the actions of the school.

Deslandes et al. (1997) modified version of the overlapping spheres model is of particular interest in the context of this research study because of its focus on the relationship between families and the school. While there is no doubt that the community plays an important role, this study was delimited to the first two groups. It should also be noted that the modified version of the model focused on the impact of these relationships at the secondary school level—the level of this study.

Parental Involvement and Student Achievement

There can be little doubt that parental involvement is a key factor in promoting student achievement, as there are seemingly countless studies that draw a direct line between parent involvement and student success. Hill and Taylor (2004) analyzed several decades of studies that supported the importance of the relationship between students' homes and the schools with respect to student success in school. Hill and Taylor's article, *Parental School Involvement and Children's Academic Achievement*, reported, "...it is well established that parental school involvement has a positive influence on school-related outcomes for children" (Hill & Taylor, 2004, p. 161). A substantial volume of research exists suggesting that the nexus between parental involvement and student success remains grounded regardless of gender, socio-economic status, or ethnicity (Epstein, 2010; Henderson, Mapp, Johnson & Davies, 2007; Henderson & Mapp, 2002). Research conducted by Hong and Ho (2005) analyzed data from a survey of 6,000 students in an effort to determine the impact of parental involvement on academic

performance and found that the most successful students were supported by parents who communicated with the school. These same parents were also more actively involved in school activities and frequently helped their children with their schoolwork at home (Hong & Ho, 2005).

Davalos (2000) reported similar findings when she surveyed a total of 2,621 students from three different school districts in the southwestern region of the United States. Participants in the study were asked to respond to questions about psychosocial variables, family involvement, and delinquent behaviors. Davalos' (2000) analysis of the survey data revealed that increased levels of parental communication and support were also tied to a significant decrease in the likelihood of their students engaging in delinquent behaviors. Henderson and Berla (1994) found that students with involved parents were significantly less likely to demonstrate behavioral problems in school.

Other researchers have conducted more sweeping examinations of the research, and most have drawn similar conclusions. Henderson and Berla (1994) conducted a meta-analysis of 66 different studies that focused on the impact of parental involvement in the schools their children attended. They concluded that students with involved parents were more likely to get good grades and to successfully complete high school. They suggested that these same students were less likely to receive any special education services. Other key findings were that students with involved parents had better attendance, and exhibited fewer behavior problems. Henderson and Berla (1994) summed up their findings by concluding that the most accurate predictor of a student's achievement in school was not income or social status, but the extent to which that student's family was able to:

1. Create a home environment that encourages learning,
2. Express high (but not unrealistic) expectations for their children's achievement and future careers, and
3. Become involved in their children's education at school and in the community.

(p. 1)

Jeynes (2005) conducted a meta-analysis of 41 different research studies that looked at the effect of parenting on elementary-age children in urban schools. This analysis of research included data from over 20,000 participants and focused on variables such as parental involvement, communication, parental expectations, attendance, and parenting style. Jeynes' findings were consistent with the analysis of Hill and Taylor (2004) who concluded that there was a statistically significant relationship between parental involvement and academic achievement. Jeynes' (2005) analysis of the data indicated that the effect remained significant for both males and females and also for those ethnic minorities included in the study.

Hill and Tyson (2009) conducted a meta-analysis that focused on the effect of parental involvement on the achievement of middle school students. They analyzed data from 50 different studies and also found a statistically significant positive relationship between parental involvement and academic achievement that remained in place regardless of race. The study concluded that the most effective forms of parental involvement focused on achievement and on the broader goals of education.

Henderson and Mapp (2002) made the case for parental involvement quite clearly when they stated that:

Students with involved parents, no matter what their income or background, were more likely to earn higher grades and test scores and enroll in higher-level programs; be promoted, pass their classes, and earn credits; attend school regularly; have better social skills, show improved behavior, and adapt well to school; and graduate and go on to postsecondary education. (p. 7)

One of the key findings of Henderson and Mapp's (2002) research was that all parents have an opportunity to make a positive impact on their children's performance at school. They found this holds true regardless of the cultural background, the socio-economic status, or even the educational level of the family (Henderson & Mapp, 2002). Taken as a whole, the evidence clearly indicates that the work of school leaders must include sincere efforts to engage parents in the education of their children (Constantino, 2002, 2010).

Barriers to Parental Involvement

While both parents and schools have expressed a desire for more meaningful communication, numerous barriers frequently impede the development of such relationships. From demographic characteristics such as socio-economic status to an apparent decrease in parental involvement as students grow older, research has shown that these barriers present a challenge to school leaders seeking to promote the kinds of relationships that have been linked to increased student academic performance. Epstein (2010) recognized that parents frequently become less involved in education as their children grow older and suggested that "...schools' and families' interactions need to fit the age, grade level, and level of social and cognitive development of the children" (p. 30).

Other researchers have echoed the view that parents of older students tend to participate less in the educational process (Henderson & Mapp, 2002; Koch, 2010; Westergård & Galloway, 2004). A study conducted by Lyon (2008) supported the notion that contact between students' parents and school decreases as children get older. Armstrong-Piner (2008) reported the findings of a national study conducted by the U.S. Department of Education that also supported the overall level of parental involvement generally decreases as children grow older and move from elementary school to middle and high school.

Yet, a daily challenge for school leaders across the United States is to motivate and involve stakeholders, especially the parents of the students who attend their schools, to become involved in the functions of school. Epstein, Galindo, & Sheldon (2011) reported that multiple studies have shown parental involvement does not appear to be a high priority for the organizations that are responsible for teacher certification at the state level. Epstein et al. (2011) found that educators frequently lack the kind of training that would allow them to effectively foster relationships with the parents of their students. In the introduction to her most recent book, Epstein (2010) made the case that "...most teachers and administrators...are presently unprepared to work positively and productively with one of the constants of life in school – their students' families" (p. 5). Other research seems to support Epstein's views. For example, Lyon (2008) suggested "...lack of skill in managing involvement was seen as a barrier to parent volunteerism and governance" (p. 36). Murphy (2008) reported that very few teacher and leadership preparation programs include specific training on how to promote parental involvement.

The lack of training tends to produce educators who are ill-prepared to work effectively with and involve students' parents in their educational process (Murphy, 2008).

Numerous studies have shown a direct link between the socio-economic status of families and the degree to which they communicate with the school. Hill and Taylor (2004) reported that low-income parents were less likely to be involved with the school than were parents with higher incomes. Bouffard (2006) also found that parents from lower socio-economic backgrounds were less frequently involved in the education of their children than were parents from higher socio-economic backgrounds.

The lack of parental involvement was found to be particularly evident among children whose parents lived in poverty, especially in the area of home-school communications (Bouffard, 2006). Lareau (2003) added that socio-economic status could impact the very nature of parent-school communication as low-income parents reported higher levels of negative feedback from teachers. Many of those same parents also reported a fear that the school might disapprove of their parenting style. Lareau suggested that many of these problems might stem from bad experiences the parents themselves had when they were enrolled in school. Reed (2008) echoed these concerns, suggesting "...for some parents, a negative high school experience of their own makes them feel uncomfortable in a school setting and keeps them from becoming involved" (p. 1).

Many researchers have pointed to logistical barriers as another factor which may contribute to the decrease in parent communication (Reed, 2008). Koch (2010) suggested that parents' busy schedules make it difficult for them to get involved in their children's education. Alvarez (2009) reported that teachers also frequently report not having

enough time to devote to parents. In one school that Alvarez studied, a total of 56% of the teachers surveyed felt that they simply did not have enough time to devote to parental communication. Constantino (2003) took the argument one step further and suggested that changing family structures might frequently contribute to this growing lack of time.

Epstein et al. (2011) touched on this in their discussion of the societal changes which prompted the development of the spheres of overlapping influence. They suggested that "...schools have had to replace traditional images of family life and patterns of communication with mothers at home with new images and new patterns of communication to accommodate different types of families" (p. 30). They concluded that existing models of parental engagement simply could not accommodate this type of sweeping societal change.

While research leaves little doubt that educators have the power to overcome existing barriers to parental involvement, it also suggests that the process will require more than is currently being done (Aikens, 2001; Graham, 2009). A growing amount of research points to the use of technology as a uniquely effective tool that can be used to confront many of the identified barriers to increased parental involvement. As more and more Americans begin to use electronic media to connect with one another, so too have school leaders begun to examine the ways in which modern technology can help to support the kinds of positive relationships which have been shown to promote increased student achievement.

The Role of Technology

The work of Epstein (1995) provided researchers with a framework of six types of parental involvement to help guide their efforts to involve parents in the educational

process. Wood (2009) examined Epstein's framework in the context of technology and pointed out that an effective school technology plan can serve to enhance each of the six types. She suggested that school improvement goals "...may be achieved and enhanced via technology, such as school web pages, electronic mail, and school information systems. These technologically-based forms of communication can all serve to connect families with schools and encourage parent involvement" (p. 29). Epstein (1995) went on to suggest that these forms of technologically-based communication have the additional advantage of allowing both parents and educators to communicate using a shared vocabulary.

Blanchard (1998) also addressed the link between technology and parental involvement, pointing out that many Americans expect technology to accomplish an incredibly wide range of tasks. He held that "...one of these tasks is nurturing the moral, social, and educational development of American children," and went on to add that "...to accomplish this task, technology must deal with the challenge of connecting the two major institutions of learning for children: families and schools" (p. 235). Blanchard ultimately identified four different areas in which he saw that technology had the potential to promote what he called the "family-school connection" (p. 1).

Blanchard (1998) believed that the first of these opportunities lay in increased communication, pointing out that technology makes communication between the school and home easier than ever before. When used effectively, technology enables parents to keep up-to-date with the important happenings at their child's school. It allows them to communicate with teachers in a very non-threatening way, and it can also help to draw parents into the shared decision-making process. Hiller (2005) pointed out that the

importance of this kind of capability continues to grow as an increasing number of parents report that they have less and less time to spend with their families. He suggested that technology can be used as a tool to make it more convenient for parents who are often pressed for time to be involved with their children's education. Reed (2008) concurred, pointing out that computer technology can often allow parents to overcome this barrier to involvement.

Indeed, numerous researchers have underscored the validity of this perspective. Kennedy, Smith, Wells, and Wellman (2008) reported that a majority of adults felt that modern technology had allowed them to stay in closer touch with their families than had previously been possible. Beeman (2008) surveyed parents about their views on school websites and found that most parents "...were enthusiastic about the potential advantages that the school web sites [sic] offered" (p. 86). Blanchard (1998) saw an opportunity for technology to help with learning and instruction. He pointed out that it can help to give parents the tools and the information they need to both support and extend the work of their child's instructors. From keeping up-to-date with assignments to having access to complex simulations, technology empowers parents to continue the work of the school at home. Other researchers have reported similar findings. Bessel, Sinagub, Lee, and Schumm (2003) revealed that parents who had attended a computer training class "...were better able to assist their children with schoolwork on the computer and with computer-related problems" (p. 9).

Epstein's (2010) framework of involvement dealt specifically with this aspect of the school-home relationship, and it comes as no surprise that numerous studies have served to underscore the importance of this particular function of technology. Tobolka

(2006) reported on a number of benefits derived from the parental use of online curriculum resources, suggesting that this use of technology allowed parents to feel more involved in their children's classwork. VanBrenk (2008), likewise, shared that the use of online resources allowed parents to have more informed discussions with their children about what was happening at school. In fact, VanBrenk concluded there was strong evidence that the use of technology can have "...a significant and positive impact in enhancing a parent's level of engagement in the academic lives of their high-school-aged student" (p. 165).

Blanchard (1998) went on to suggest that technology provides parents with the tools they need to ensure that children remain motivated and engaged. In addition to engaging online content, he suggested that the schools that use technology most effectively create virtual communities where parents can interact with one another. The authors of another study agreed; they highlighted a school-based computer skills class designed to reach out to minority and low-income parents (Bessel et al., 2003). They reported that participation in the program led to a variety of positive outcomes including the acquisition of skills, increased levels of self-esteem, and positive interactions with school personnel.

It seems clear that technology has an important role to play as educators work to promote the kind of parent-home connections that have been shown to positively impact student achievement. From helping to facilitate communication to promoting an increased sense of community, modern forms of technology now provide educators with almost limitless opportunities to engage both students and parents with the learning process.

It comes as no surprise that many schools already use at least some form of technology to assist in their efforts to reach out to stakeholders. Indeed, the current body of literature includes research documenting the widespread use of a variety of technologies on the part of schools. The largest portion of that research has focused on the educational use of three specific forms of technology: e-mail, text messaging, and the Internet.

E-Mail

Researchers generally give credit for the invention of e-mail to an engineer from Cambridge, Massachusetts named Ray Tomlinson (Boone, Secci, & Gallant, 2010; Fallows, 2002). As early as 1972, Tomlinson had figured out how to combine the functionality of two separate computer programs to facilitate the creation of what would later be known as electronic mail. The first computer program allowed Tomlinson to leave messages on a shared computer, while the other allowed users to transfer files between computers. Tomlinson combined the functionality of the two programs and added an @ sign which made it possible to address messages to specific users. The system quickly caught on, and by the middle of the 1980's it was not uncommon for academic researchers to communicate using e-mail (Boone et al., 2010). Nearly 40 years later, e-mail is fast becoming the primary means of communication between parents and teachers (Thompson, 2008).

A growing number of researchers have examined the use of e-mail as a means of communication between school and home, and most have concluded that its ubiquity and speed combine to make it an extremely powerful tool (Fuchs, 2004; Kilgore, 2010; Reed, 2008). VanBrenck (2008) reported that parents rated e-mail as a significantly more

effective means of communicating with teachers, pointing out that its interactive and bi-directional nature made it particularly appealing to parents. Reed (2008) suggested that the availability of free e-mail accounts make it a more cost-effective means of communicating than the telephone. She went on to report that the use of electronic mail had a significant positive impact on the amount of communication that took place between parents and teachers.

In spite of its potential to promote increased communication, researchers have also identified certain inadequacies about the ways in which educators are currently making use of electronic mail. One common parent complaint is that schools can sometimes make it difficult for parents to locate teacher e-mail addresses online (Dyrli & Stager, 2005; Tubin & Klein, 2007). Thompson (2008) also pointed out that the non-verbal nature of e-mail meant that parents often had a more difficult time interpreting the tone of messages that were relayed with the use of e-mail. He suggested that “...communicating via phone was more appropriate to discuss serious behavioral issues because the teacher could explain the situation in more detail and could easily regulate the tone of the communication” (p. 213). Glendinning (2006) echoed this concern when he argued that e-mail frequently constrains the author’s “...ability to convey tone, stress, and nuance” (p. 2). Kilgore (2010) likewise suggested that e-mail had the potential for conveying unintended meaning.

Text Messaging

While experts agree that the origin of the text message cannot be traced back to a single inventor, media outlets have shown a great deal of interest in assigning credit for its invention (Hillebrand et al., 2010). The authors of one book on the subject of text

messaging explained that newspapers have put forth at least two different accounts of its creation in an attempt to appeal to readers (Hillebrand et al., 2010). In one version of the story, credit was given to a Finnish engineer who claimed to have discussed the idea with his colleagues as early as 1982. In a different version of the story, the credit for its creation went to a group of engineers who worked for the cell phone carrier Nokia. Although both accounts garnered a great deal of media attention at the time of their publication, neither story came close to explaining the complicated and nuanced history of this popular new form of mobile communication.

The problem is in large part due to the fact that the transmission of text using electronic media is not a new idea. Indeed, Samuel Morse had successfully used the telegraph to transmit messages even before the turn of the 20th century (Gleick, 2011; Hillebrand et al., 2010). In the 1970's, Telex provided mobile text messaging capabilities between ships and aircraft, while personal pagers and fax machines provided similar functionality.

Pearce (2011) acknowledged the long history of innovation but suggested that modern telephony began a period of unparalleled and substantial change during the late 1980's. He explained that "...developments in radio and cellular technologies, coupled with the miniaturization and cheapening of computing hardware, enabled new possibilities: networks in which people could carry their telephone devices with them" (p. 4). Other experts have agreed with Pearce's assessment, suggesting that the development of this shared infrastructure led to the inevitable development of modern SMS capabilities (Hillebrand et al., 2010).

Research into the educational use of text messaging has revealed that it is an increasingly popular form of communication between students and teachers (Cheung & Hew, 2009; Goomis, 2010; McClean, Hagan, & Morgan, 2010). Researchers have identified multiple benefits associated with the use of texting, including speed, ease of use, and the ability to target messages to groups of users (Galuszka, 2008; Joyce & Weibelzahl, 2011; Naismith, 2007; Thomas & Orthober, 2011). In one study, 89% of respondents agreed that the use of text messaging was a useful method for communicating with teachers (McClean et al., 2010). In another study, Goomis (2010) reported that participants felt that text messaging was particularly helpful "...because their cell phones are always with them and it serves as a potential for immediate answers" (p. 91). Parents have also seemed to indicate their support for text messaging; in one study, parents reported that the use of text messaging allowed them to have a closer relationship with their child (Akamatsu, Mayer, & Farrely, 2006). They went on to say that it also allowed them to be more knowledgeable about what was going on at the school. Researchers have also pointed out that text messaging technology is particularly suitable in helping to facilitate communication with disabled students and parents (Akamatsu et al., 2006; Okuyama & Iwai, 2011).

The Internet

The Internet has come to play a dominant role in American culture. Since its inception as a research network connecting colleges and universities, its popularity as a communications medium has grown to encompass most of the developed world (Lenhart et al., 2010). Indeed, recent estimates from the Pew Research Center indicate that 74% of Americans aged eighteen or older are currently Internet-connected (Rainie,

2010). Nationwide, the Miniwatts Marketing Group (2009) reported a 30% increase in Internet connectivity since the year 2000. School districts throughout the nation have recognized the importance of the Internet as a tool for communicating with stakeholders, and as American households have raced to get connected, American public education has worked to keep pace with the new demand for online information. School leaders are eager to realize the full potential of this powerful new medium, but they still have work left to do. Bouffard (2006) indicated that the Internet seems to be an under-utilized resource in the ongoing struggle to promote increased communication between the parent and the school.

The relative youth of the Internet and the inherent complexity of the technology involved have combined to present educators with a unique set of problems as they seek to harness the true power of this new medium. Today, most public high schools use a variety of methods to maintain at least some presence on the World Wide Web (Swann & Fenner, 2005). While many school districts facilitate the web design process by employing full-time webmasters with extensive technical knowledge, other districts delegate the task to either teachers or administrators at individual schools. Some school districts even use a hybrid of the two approaches; employing a professional web designer to maintain the district presence while leaving individual schools to design and update their own sites. Tubin and Klein (2007) noted that many districts opt to purchase pre-designed templates which are then "...further developed and designed by the school's staff" (p. 194).

Regardless of the methods used to create and maintain a school's presence on the web, the truth is that the final product does not always deliver on the Internet's promise

of helping to increase parent involvement. In one study of fifty high school websites, researchers found that "...the majority of schools used their Web site as a vehicle to post general information about their school, as opposed to creating a site which promotes the involvement of stakeholder interaction" (Algozzine et al., 2006, p. 62). The authors noted that "...while the vast majority of high schools appropriately addressed web design issues, we felt other features, such as the illustration of student work, accessibility, testing information, and parent-teacher communication needed to be improved" (p. 57). Numerous other studies have reported on other parent complaints. In many cases, parents were disappointed by inconsistent updating of school pages, and in others, parents complained about the difficulty of finding even basic contact information (Beeman, 2008; Eggeman, 2008).

Difficulty of Designing for the Modern Web

Those researchers seeking to examine the use of technology as a tool to promote increased communication are presented with a unique problem; modern technology is evolving so quickly that even the most carefully planned research is almost immediately at risk of becoming out-dated. Research on the use of cell phones is illustrative of this point. In 2002, the Environmental Protection Agency published information indicating that the average lifespan of a modern cell phone was limited to just 18 months. They reported approximately 100 million cell phones are retired each year. It should come as no surprise that researchers seem to have had a difficult time keeping up with the continued evolution of mobile communications technology.

It is an unfortunate fact that the speed of innovation in the field of information technology often outpaces the market's ability to impose some type of order on new and

competing technologies (Bazar, 2006). One hundred years ago, Thomas Edison and Nikola Tesla competed for dominance of the new electrical market while consumers watched helplessly from the sidelines, unable to predict whether direct current or alternating current would end up being the de facto standard for the new electrical industry (Schewe, 2007). Today, those seeking to develop content for the Internet face a similar quandary. Indeed, the challenge facing today's web developers is in many ways even more daunting. Those organizations seeking to establish a presence on the Internet are faced with a myriad of choices that make it virtually impossible to form a truly knowledgeable opinion about the most effective way to proceed. If they are to be effective at their task, designers must make very specific choices about the way they will address two overarching problems.

The first problem that designers must address concerns what might most easily be referred to as the *front end* of the modern web. The problem presents itself through the variety of ways in which consumers can access the Internet. In point of fact, it has become almost misleading to talk in general terms about *the Internet* at all, for the experience of interacting with online content can vary widely depending upon the outcome of a host of choices that consumers make about the hardware, operating systems, and web browsers that they use to access the Internet.

In today's modern world, consumers can connect to the Internet just as easily using a brand new desktop computer as they can with a ten-year-old laptop. They also have at their disposal a staggering variety of other devices, from netbooks to iPads to mobile phones. Even home gaming consoles like the Wii, the X-Box, or the Play Station 3 now come with the ability to connect directly to online content. Each of these devices

has a slightly different resolution, and each of them can run a different version of its own unique operating system (OS) like Microsoft's Windows, Apple's iOS, or the open sourced Linux. To complicate matters even more, every operating system can run an almost countless number of unique web browsers, each designed to present online content in a slightly different way. As designers work to create websites that are both useful and engaging, they are forced to work within the constraints presented by each individual user. Failure to work within these constraints causes problems. Krug (2005) summed it up nicely:

Like any good design, successful Web pages are usually a delicate balance, and it's important to keep in mind that even a minor change can have a major impact. Sometimes the real challenge isn't fixing the problems you find – it's fixing them *without* breaking the parts that already work. (p. 158)

Failure to pay attention to even the smallest design considerations can mean that each and every viewer is presented with a slightly different version of exactly the same content. Hill (2012) touched on the issue when he discussed the fact that page navigation can sometimes fail to work as anticipated when displayed on different types of mobile browsers.

In a worst-case scenario, visitors to a site might be left seeing nothing at all. One of the most frequently-cited examples involves Apple's iOS operating system and its lack of support for Adobe's proprietary Flash player. While some reports indicate that up to 75% of the video currently available on the web is in Flash format, Apple has steadfastly refused to support the technology on their mobile platform (Castelluccio, 2010). This

means that sites choosing to use the popular technology are virtually invisible to users of both the iPhone and the iPad.

The challenge of designing content for such a plethora of media is daunting to say the least, but it is a challenge that can be overcome with the proper amount of forethought and planning on the part of the organization itself. As one author put it, "...a little time invested early in the web design process can allow us to focus on content and creativity instead of whether or not our nested table structure will look good on a Pocket PC" (Fox, 2008, p. 14). Unfortunately, the path becomes less clear as developers seek to overcome the second major hurdle, for this second problem is of an entirely different and inverse nature. It deals not with the mechanical limitations of the web's front end, but with the almost limitless toolbox that designers have at their disposal as they work on what might be called the "back end" of the web, making the practical design decisions about the tools that will be used in order to create a particular website. Put simply, the business of web design has grown far too complex for a single person to master all of the skills needed to design a professional website, for as the web has grown in complexity, so too have the tools that are used to bring it into existence.

Ankerson (2010) spoke to this problem quite eloquently as she examined the development of the web design industry in her 2010 dissertation. She explained that by 1997, "...the web design skill-set was framed as an incredibly broad category that called on a wide range of competencies: HTML, interface design, web server configuration, UNIX, graphics software, writing and editing, programming languages, information architecture, and database management." (p. 150). Hill (2012) put the issue in context for educators when he stated that the majority of web design tools have become so complex

that they are simply beyond the reach of most teachers who are interested in creating online content.

For school leaders seeking to create dynamic sites which engage parents in the educational process, the situation is dire; while the private sector can afford to hire designers with knowledge of the most up-to-date technology, few school systems are in a position to do the same. Those teachers and schools seeking to make use of the power of the Internet are often given very little support in their efforts to do so. Even though many school districts employ full-time webmasters, the professionals who fill those positions rarely have the time to work individually with each teacher in the district (Hill, 2012).

The terrible reality is that most teachers are simply not up to the task; the dizzying array of competing techniques, languages, and platforms keep all but the most intrepid educators from experimenting with the newest and most engaging design formats. Acquaro and DeMarco (2008) pointed out that most teachers who work to create their own sites often lack the requisite skills that might allow them to create quality content. Angle (2010) pointed out that a majority of teachers were unable to create, develop, and use current technological tools. Ricadela (2008) confirmed that most teachers lack the technology training needed to help make an impact on student outcomes. Camerino (2009) went one step further and held that teachers are frequently reluctant to try new things even after they have received training.

It should come as no surprise then, that the majority of schools have done a relatively poor job of establishing a useful presence on the Internet. Swann and Fenner (2005) reported that in 2001, only 75% of public schools even had a website. To make matters worse, they went on to report that 41% of those schools who did have a web

presence had resorted to using students to help with the creation of the site. These kinds of reports only serve to reinforce the prevailing perception that today's schools have become cut off from the real and authentic digital world into which most students were born (Angle, 2010).

Cell Phones and the Mobile Web

A 2010 report from the Pew Research Center highlighted the fact that an increasing number of Americans are making use of the mobile data capabilities that come with most modern cell phones; it revealed that in April of 2009, only 25% of respondents reported using their phone to access the Internet, but that by May of 2010, the number had grown to 38% (Smith, 2010). A more recent report from that same organization indicated that 47% of Americans over the age of 18 are currently using some type of mobile device to access local news and information (Purcell, Rainie, Rosenstiel, & Mitchell, 2011).

Most technology experts seem to agree that the cell phone will continue to be a popular choice for accessing online content. When Anderson and Rainie (2008) surveyed almost 1,200 technology experts about their predictions for the future of the Internet, a majority of respondents agreed that "...the mobile device will be the primary connection tool to the Internet for most people in the world in 2020" (p. 2). The authors went on to reveal that "...the consensus is that mobile devices will continue to grow in importance because people need to be connected, wherever they are" (p. 26).

When the Pew Research Center (Smith, 2011) conducted research on the number of cell phone owners who already use their phone as their primary source of Internet connectivity, data revealed that 25% of smartphone owners use their phone in this

manner. Table 1 reveals that this trend seems to be correlated to race, household income, and education level (Smith, 2011).

Table 1

Percentage of smartphone owners who use their phone as their primary source of Internet access

All smartphone owners	25%
Race/Ethnicity	
White, Non-Hispanic	17%
Black/Latino	38%
Household Income	
Less than \$30,000	40%
\$30,000 - \$49,999	29%
\$50,000+	17%
Education Level	
High School Graduate	33%
Some College	27%
College Graduate	13%

As if to emphasize the importance of these statistics to educators, another report from the Pew Research Center (Smith, 2010) revealed that cell phone usage by ethnic minorities has officially eclipsed that of White Americans:

Nearly two-thirds of African Americans (64%) and Latinos (63%) are wireless Internet users, and minority Americans are significantly more likely to own a cell phone than their White counterparts (87% of Blacks and Hispanics own a cell phone, compared with 80% of Whites). Additionally, Black and Latino cell phone owners take advantage of a much wider array of their phones' data functions compared to White cell phone owners. (p. 15)

This information is particularly noteworthy when considered in conjunction with the fact that those same subgroups account for an overwhelming majority of Americans living in poverty (University of Michigan, 2012). Indeed, data from the most recent U.S. census revealed that a total of 12.4% of Whites under the age of 18 were living in poverty at the time of the report, compared with 38.2% of Blacks and 35% of Hispanics (Walt, Proctor & Smith, 2011).

Furthermore, recent polling data indicate that teens from low-income families are even more likely to use their cell phones to access the Internet. In one study, researchers found that 21% of teens with no other access to the Internet reported using a cell phone to go online (Lenhart et al., 2010).

Summary

Research has consistently shown that there is a powerful link between increased parental involvement and academic success. Researchers have examined the link and have found that it persists regardless of educational background and across socio-economic boundaries. And while parents tend to become less involved with their children's academics as they grow, the power of this parental connection to impact achievement remains strong well into high school. Existing research on the use of technology would seem to indicate that it is in an ideal position to help educators overcome some of the most challenging barriers to increased communication. As educators work to incorporate these new technologies into their school improvement plans, their efforts must be guided by the most up-to-date research into the ways in which people use technology. This research study represents an effort to contribute to that body of knowledge.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this study was to examine the use of the mobile web as an effective means of facilitating increased parental involvement in the local school. As principals seek to engage parents in the educational process, they must constantly reassess their plans for school improvement to ensure that they are supported by the most up-to-date evidence-based research. The most successful principals will seek out information on the most effective ways of reaching out to stakeholders and involving them in the educational process. While the Internet can be viewed as a powerful tool that has the potential to reach across both economic and racial lines, it is a complex tool that requires a high degree of skill if it is to be used effectively.

In this chapter, the researcher will put forward the research questions that were addressed by this study. The associated hypotheses will also be discussed. The researcher will move on to discuss the design of this study. Details about data collection procedures will be presented along with the manner in which data were analyzed once they were collected. The researcher will address both the manner in which participants were chosen for inclusion in the study and the rationale behind their selection.

Research Questions

This study seeks to address the following research questions:

1. Is there a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's web site?

2. Does the availability of a mobile version of a website significantly increase the frequency with which that site is accessed?
3. To what extent are current high school webmasters knowledgeable about the design of mobile websites?

The research questions led to the development of the following hypotheses:

H₁: There is a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's webpage.

H₂: The availability of a mobile version of a website significantly increases the frequency with which that website is accessed.

Research Design

This research study made use of a quasi-experimental and quantitative design to study four different variables. Those variables included the socio-economic make-up of a school, the manner in which users access the school's website, and the frequency with which the school's website is accessed. The independent variables were the socio-economic make-up of each school and the availability of a mobile version of a school's website. The dependent variables were the manner and frequency with which the school's site was accessed. The researcher also collected descriptive data about each webmaster's knowledge of both mobile and traditional web design.

Since the sensitive nature of personal financial information makes it difficult to obtain reliable data about the socio-economic make-up of public schools, the United States Department of Education often measures the concentration of poverty within a school by using data on the percentage of students who qualify for free or reduced price

school lunches (U.S. Department of Education, Institute of Education Sciences [IES], 2007). While specific data about individual students within the district being studied was not available, the Georgia Department of Education does publish information on the overall percentage of students at each school who qualify for free and reduced price lunches. For this study then, the researcher chose to use this participation data to obtain a reliable estimate of the socio-economic make-up of the stakeholders at each school.

It is a much easier task to obtain detailed information about the manner and frequency with which each school's website is being accessed. Indeed, a wide range of companies make analytic software that has been specifically designed to collect this type of data. The researcher made the decision to use a product designed by Google. The company's Google Analytics service is made available free of charge, and it allows users to collect information from a large number of pages across multiple domains. It does this through the use of a unique Google Analytics Tracking Code, or GATC. The GATC is actually a unique block of JavaScript which is inserted within the HTML header of each webpage being monitored. The code collects detailed information about each visitor to a site; it then saves this information to a database which can be accessed using an online dashboard.

The service is quite powerful, and it provides users with an almost overwhelming amount of data, including the operating system being used by each visitor and the type and version of the web browser that each visitor is using to access the content on a particular site. These details are used to generate a report that shows the total number of visits by both mobile and non-mobile devices during a specified time period. The

researcher used the data from this report to determine the manner in which users accessed each school's website.

The GATC also collects information about each user's location, their preferred language, and the number of times each user has visited a particular web page. It provides webmasters with a detailed report on this last piece of information, showing the total number of unique visitors to a site within a specified time period. The researcher used the information from this report to determine the frequency with which visitors accessed the web pages being studied.

The researcher used correlational procedures to determine if there is a relationship between the socio-economic make-up of a school and the frequency with which users access the school's website using mobile devices. The researcher then conducted a repeated measures ANOVA to determine if the availability of a mobile version of a website significantly increases the frequency with which users access that site using mobile devices.

The researcher also distributed a survey to collect descriptive data about the webmasters at each of the schools within the district. The survey was developed with the assistance of an expert in the field of professional web design. It was composed of questions designed to gather information about each webmaster's knowledge of web design, their knowledge of web standards, and their knowledge of the principles of mobile web design. The expert who assisted in the creation of the survey was employed as a full-time web designer.

Sample/Participants

This study made use of archival data from a variety of sources. Information about the socio-economic make-up of individual schools being studied was obtained from the most recent annual reports made available by the Georgia Department of Education (GADOE). That agency provides an annual report listing the current percentage of students eligible for free and reduced meals at individual schools throughout the state, including each school within the district being studied. No identifying information about individual student participation in the school lunch program was used as a part of this study. Information about the frequency and type of website access was collected using Google Analytics during two separate two-week periods at the end of the 2012-2013 school year. The researcher elected to collect data during the last part of the school year because of the likelihood that parents access information on the web more frequently at the beginning and end of each school year; the two-week collection periods were intended to help to minimize the impact made by any daily fluctuations in web usage patterns. Technical information was collected about each visitor's computer and Internet connection, but no other identifying information was collected as a part of the study.

The participants who were examined as a part of this study reside in a large suburban school district in the south-eastern United States where student enrollment includes more than 107,000 students. White students represent the largest percentage of the district's population, with a total enrollment of 48,492 students, or 44.5% of the total student body. Black students account for another 31.2% of the total, with 33,084 students in attendance. The third-largest ethnic group includes 15,350 Hispanic students, or 16.5% of the district's enrollment. The remaining 7.8% of the population includes Asian, Multi-

racial, and American Indian students who represent a total of 4.8%, 2.7%, and <0.1% of the district, respectively (Cobb County School District [CCSD], 2010).

District-wide, a total of 57% of students are eligible to participate in the free and reduced meal program. The GADOE disaggregated these data for all schools within the district and identified 48 schools where at least 50% of the student population qualified for free or reduced price meals during the 2010-2011 school year. This number represents just over 42% of the schools in the district (Georgia Department of Education [GADOE], 2011).

School district faculty and staff were also included as a part of the study. The researcher worked with a central office employee to develop a survey that was distributed to a total of 10 high school webmasters. The district employee worked with the district's communications department and was an expert in web design. Participation in the survey was voluntary; the study was approved both through the school district's Institutional Review Board and the University's Institutional Review Board.

Instrumentation

The survey that was used as a part of this study was designed to collect descriptive data about school webmasters' knowledge of web design, their knowledge of existing web standards, and their knowledge of the principles of mobile web design (Appendix A). The researcher designed the survey with the assistance of an expert with specific knowledge of both educational website design and mobile website development. The first question on the survey asked participants about the amount of time that they have served in the role of webmaster. The remaining 15 questions included in the survey were based on a 5-point Likert Scale ranging from 1 (*strongly disagree*) to 5 (*strongly*

agree). Questions 1 - 5 asked about participants' knowledge of web design, while questions 6-10 asked about their knowledge of existing web standards. Questions 11-15 asked about their knowledge of mobile web design.

Procedures

Permission was first obtained from the university's Internal Review Board (Appendix B). The researcher then applied for approval from the school district (Appendices C and D). When the district approved of the study, the researcher accessed the GADOE data on the overall percentage of students at each school who qualified for free and reduced price lunches. The researcher then worked with the school district's webmaster to add the appropriate Google Analytics tracking code to the HTML header for each of the 11 high school websites being studied. Data about the frequency and manner in which those sites were accessed was collected over a two-week period at the end of the 2012-2013 school year. The tracking code was removed from all but one of those sites at the end of the initial two-week collection period.

The researcher then made available a mobile version of one of the district's high school websites. Once this site was made available, users of cell phones and other mobile devices were automatically redirected to the mobile version of the site whenever they visited. The Google Analytics tracking code remained in place on this site for a second two-week data collection period so that data could be collected on the frequency and manner in which users accessed both the mobile and non-mobile versions of the pages that made up the school's website. The tracking code was removed from the website at the end of this second two-week collection period.

The researcher also administered a survey to the webmasters at 10 of the 16 high schools within the school district. The school district limited the scope of the study to only 11 schools, and one additional school was omitted from the survey because it was the school at which the researcher was employed. That school was omitted from this part of the study because the researcher's duties included the design and upkeep of the school's website.

Data Analysis

This research study addressed several research questions. The first research question examines the relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's website. After collecting and entering all of the data, the researcher used SPSS to conduct a Pearson Product Moment Correlation to examine the relationship between the two variables and determine if it is significant.

This study also sought to gather information about current high school webmasters' knowledge of web design. To this end, the researcher collected data from the survey and then entered it into an Excel spreadsheet. Responses were then transferred into SPSS. A nominal scale was used for web design experience while an interval scale was used to assign numeric values to the responses from the Likert scale. Descriptive statistics for all responses were then computed and reported.

The final research question of interest to the researcher examines the relationship between the availability of a mobile version of a website and the frequency with which that website is accessed by users. Two sets of frequency data were collected from a single high school in the district being studied. The first set of frequency data was

collected before the introduction of a mobile version of the school's site. The second set of frequency data was collected after the mobile version of the site had been made available to users; it provided a detailed look at how frequently each of the pages on the school's site was accessed after the introduction of the mobile version of the site. The researcher then conducted a repeated measures ANOVA to determine if the availability of the mobile version of the site had significantly increased the frequency with which users accessed the site using mobile devices.

Summary

Research has established the existence of a link between increased parental involvement and academic performance that persists regardless of race, socio-economic status, or gender. Research has also shown that technology can be a powerful tool in the school's quest to engage parents in the educational process. In this chapter of the study, the researcher has presented information about the participants, research questions, research model, and data analysis procedures for the current study. Over the course of the study, the researcher collected quantitative data about the socio-economic make-up of the schools being studied, the frequency with which the mobile web was used to access each school's website, and the school webmasters knowledge of web design. The researcher then analyzed these data to determine if there was a relationship between any of the variables being studied. The results of the study will be presented in Chapter IV.

CHAPTER IV

ANALYSIS OF DATA

Introduction

The purpose of this study was to determine whether or not there exists a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access that school's web site. A further goal of the study was to examine the effectiveness of implementing a mobile version of a website in order to make the content accessible to a wider audience. The study also sought to examine high school webmasters' knowledge of web design. In this chapter, the researcher will present the findings of the quantitative analyses conducted to investigate these relationships. The first part of the chapter includes descriptive statistics and statistical analysis pertaining to Research Questions 1 and 2. Findings pertaining to Research Question 3 are presented in a similar manner.

Descriptive Statistics Pertaining to Research Questions 1 and 2

The school district that was included as a part of this study chose to limit the number of schools at which the researcher was permitted to collect data. The district itself is made up of 16 different high schools, and the researcher was given permission to collect data at a total of 11 of those schools. Of the 11 schools for which permission was granted, only one principal declined to allow the researcher to collect usage data about the school's website. For each of the remaining schools, the researcher used a computer script to collect usage data on the manner and frequency with which users accessed each school's site. An overview of this information is presented in Table 2.

Table 2

Frequency of Visitors by School and Mode of Access (N=15)

School		Min	Max	Mean	SD
School 1	Mobile Visitors	66	141	119	20.877
	Non-Mobile Visitors	137	762	478	199.635
	Total Visitors	203	902	597	218.909
School 2	Mobile Visitors	149	393	305.73	80.136
	Non-Mobile Visitors	298	1484	1005.2	374.693
	Total Visitors	452	1799	1310.93	448.482
School 3	Mobile Visitors	80	156	124.8	21.305
	Non-Mobile Visitors	103	563	372.4	145.903
	Total Visitors	183	698	497.2	164.467
School 4	Mobile Visitors	105	229	186.67	37.984
	Non-Mobile Visitors	163	693	507	188.479
	Total Visitors	268	903	693.67	223.867
School 5	Mobile Visitors	68	238	181.13	52.499
	Non-Mobile Visitors	164	750	563.67	200.764
	Total Visitors	232	972	744.8	251.257
School 6	Mobile Visitors	35	126	79.93	25.101
	Non-Mobile Visitors	55	380	231	108.500
	Total Visitors	96	506	310.93	132.007

Table 2 (continued).

School		Min	Max	Mean	SD
School 7	Mobile Visitors	64	144	112.13	25.784
	Non-Mobile Visitors	72	460	278.93	121.513
	Total Visitors	153	580	391.07	143.767
School 8	Mobile Visitors	9	46	26.6	10.636
	Non-Mobile Visitors	31	375	188.93	95.523
	Total Visitors	40	409	215.53	104.313
School 9	Mobile Visitors	141	574	288.93	99.536
	Non-Mobile Visitors	246	1020	764	233.868
	Total Visitors	400	1405	1052.93	304.644
School 10	Mobile Visitors	21	269	153.47	63.822
	Non-Mobile Visitors	74	748	442.33	238.211
	Total Visitors	95	1017	595.8	298.777

The researcher also collected data about the socio-economic make-up of each of the schools being studied. The information presented in Table 3 is based on data published by the Georgia Department of Education showing the overall percentage of students at each school who qualified for free or reduced price lunches during the 2011-2012 school year.

Table 3

Free & Reduced Price Lunch Participation by School

School	Total Enrollment	Free Lunch	Reduced Price Lunch	Free & Reduced Price Lunch	Percent Free & Reduced
School 1	1864	325	99	424	23%
School 2	1988	490	127	617	31%
School 3	1681	418	109	527	31%
School 4	2051	337	70	407	20%
School 5	2156	1012	195	1207	56%
School 6	2664	861	258	1119	42%
School 7	1967	1194	191	1385	70%
School 8	1783	526	165	691	39%
School 9	2013	194	56	250	12%
School 10	1967	1350	160	1510	77%

Statistical Analysis Pertaining to Research Questions 1 and 2

After having retrieved all of the data pertaining to web usage and free and reduced lunch participation at each school, the researcher conducted a Pearson Product-Moment Correlation to answer this study's first research question, which was:

1. Is there a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's web site?

H₁: There is a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's web site.

In addressing Research Question 1 correlations were computed with a significance level set at $p < .05$. The results of those correlations are represented in Table 4, and they indicate that there was a significant negative relationship between the daily non-mobile frequency of use and free and reduced lunch participation for day three, ($r(8) = -.643, p = .045$), but there were no other significant relationships between the daily non-mobile frequency of use and free and reduced lunch participation for any of the other days that were studied. There were likewise no significant relationships between the daily mobile web frequency of use and free and reduced lunch participation for any of the days being studied. The researcher found no significant relationship between either the average frequency of use (across all fifteen days) of the mobile web to access participating schools' websites and free and reduced lunch participation ($r(8) = -.492, p = .148$), or the average frequency of use (across all fifteen days) of the non-mobile web to access participating schools' websites and free and reduced lunch participation ($r(8) = -.593, p = .071$).

It should also be noted that while these results do not indicate a significant relationship, an overwhelming majority of the correlations that were computed represent a large effect size. Indeed, of the 33 correlations that were computed 29 were .40 or larger in size. This would seem to indicate that a larger sample size might have revealed a significant relationship. Analysis of the data does not indicate that there is a relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's site, and the researcher thus rejected the hypothesis. These results will be discussed in more detail in Chapter V.

Table 4

Pearson Product-Moment Correlations between Frequency and Type of Web Access and Free and Reduced Lunch Participation (N=10)

	Pearson Correlation	Sig. (2-tailed)
Mobile Day 1	-.491	.149
Non-Mobile Day 1	-.572	.084
Mobile Day 2	-.425	.220
Non-Mobile Day 2	-.607	.062
Mobile Day 3	-.546	.102
Non-Mobile Day 3	-.643	.045
Mobile Day 4	-.140	.700
Non-Mobile Day 4	-.056	.878
Mobile Day 5	-.538	.109
Non-Mobile Day 5	-.435	.209
Mobile Day 6	-.433	.211
Non-Mobile Day 6	-.601	.066
Mobile Day 7	-.487	.154
Non-Mobile Day 7	-.505	.137
Mobile Day 8	-.564	.089
Non-Mobile Day 8	-.619	.056
Mobile Day 9	-.417	.230
Non-Mobile Day 9	-.589	.073
Mobile Day 10	-.468	.172
Non-Mobile Day 10	-.527	.117
Mobile Day 11	-.191	.596
Non-Mobile Day 11	-.131	.719
Mobile Day 12	-.431	.214
Non-Mobile Day 12	-.496	.144
Mobile Day 13	-.493	.148
Non-Mobile Day 13	-.609	.062

Table 4 (continued).

	Pearson Correlation	<i>Sig. (2-tailed)</i>
Mobile Day 14	-.469	.171
Non-Mobile Day 14	-.566	.088
Mobile Day 15	-.492	.148
Non-Mobile Day 15	-.574	.083
Mobile Average	-.492	.148
Non-Mobile Average	-.593	.071
Overall Average	-.572	.084

After the conclusion of the initial two-week data collection period, the researcher stopped collecting usage data for ten of the eleven schools. The computer script remained in place at the one remaining school, however, and the researcher then made available a mobile version of that school's website. Additional data were then collected on the manner in which users accessed both the mobile and non-mobile versions of that school's site. The researcher then conducted an independent t-test to examine this study's second research question, which was:

2. Does the availability of a mobile version of a website significantly increase the frequency with which that site is accessed?

H₂: The availability of a mobile version of a website significantly increases the frequency with which that website is accessed.

In addressing Research Question 2, the t-test was computed with a significance level set at $p < .05$. The researcher first compared the average number of times that one school's website was accessed using a mobile device when the mobile version of the school's website was available to the average number of times its website was accessed

when the mobile version of the site was not available to determine whether the means of the two groups were significantly different. Results indicated that there was not a significant difference between the access numbers when the mobile site was available ($M = 119.07, SD = 23.950$) and the access numbers when the mobile site was not available ($M=119.00, SD = 20.877$), $t(27) = -.009, p = .993$.

The researcher then compared the average number of times that the school's website was accessed using a non-mobile device when the mobile version of the school's website was available to the average number of times its website was accessed when the mobile version of the site was not available. There was not a significant difference between the access number when the mobile site was available ($M= 484.21, SD = 168.098$) and the access numbers when the mobile site was not available ($M = 478.00, SD = 199.635$), $t(27) = -.090, p = .929$. The researcher thus rejected the hypothesis that the availability of a mobile version of a website significantly increases the frequency with which that website is accessed.

Descriptive Statistics Pertaining to Research Question 3

The researcher worked with a professional web designer to develop a survey to help collect descriptive data about Research Question 3:

3. To what extent are current high school webmasters knowledgeable about the design of mobile websites?

The survey was designed to collect descriptive data about school webmasters' knowledge of web design, their knowledge of existing web standards, and their knowledge of the principles of mobile web design. The researcher designed the survey with the assistance of an expert with specific knowledge of both educational website

design and mobile website development. Content validity for the survey was established through consultation with this webmaster expert in the field. The survey was then piloted with a former high school webmaster who helped to provide feedback on the wording of each of the questions. This feedback prompted the researcher to alter the wording of Item 4 to clarify the intent of the question.

While the school district limited the number of schools at which the researcher was permitted to collect data, the researcher was allowed to distribute surveys to webmasters at all of the schools for which permission was granted. A total of ten surveys were distributed, and one school was omitted from the survey because the researcher was currently serving as that school's webmaster. Of the 10 surveys that were distributed, a total of 8 webmasters responded by returning a completed survey to the researcher.

Statistical Analysis Pertaining to Research Question 3

After completed surveys had been returned, the researcher numbered each survey and entered data into SPSS for analysis. The first item on the survey collected categorical data about the amount of time each respondent had served as a high school webmaster. Data from the survey revealed that 50% of those surveyed had served in that position for less than six years, while an additional 25% had no more than ten years' experience with web design. Responses to this question are summarized in Table 5.

Table 5

Webmaster Years of Experience

	Years of Experience	Frequency	Percent
1	1-5	4	50
2	6-10	2	25
3	11-15	1	12.5
4	16-20	1	12.5
Total		8	100

Responses for the remaining 15 questions were entered into SPSS using a Likert scale with anchors starting at 1 (*Strongly Disagree*) and ending at 5 (*Strongly Agree*).

The results of the survey are summarized in Table 6.

Table 6

Frequencies and Percentages of All Survey Question Responses

Survey Question	Frequency	Percentage
1. My undergraduate (or graduate) work prepared me with the technological skills that I needed to serve as my school's webmaster.		
Strongly Disagree	2	25
Disagree	3	37.5
Undecided	0	0
Agree	3	37.5
Strongly Agree	0	0
2. I am satisfied with the professional development opportunities that have been provided to me since I began serving as my school's webmaster.		
Strongly Disagree	1	12.5
Disagree	4	50
Undecided	2	25
Agree	1	12.5
Strongly Agree	0	0

Scale: 1 = *Strongly Disagree*, 5 = *Strongly Agree*.

Table 6 (continued).

Survey Question	Frequency	Percentage
3. I am comfortable with the software that I use to maintain my school's website.		
Strongly Disagree	0	0
Disagree	1	12.5
Undecided	1	12.5
Agree	1	12.5
Strongly Agree	5	62.5
4. I am able to use image editing software like Photoshop to assist me with the design of my school's website.		
Strongly Disagree	0	0
Disagree	0	0
Undecided	1	12.5
Agree	3	37.5
Strongly Agree	4	50
5. I am able to use HTML to help me troubleshoot problems with my site.		
Strongly Disagree	0	0
Disagree	1	12.5
Undecided	0	0
Agree	2	25
Strongly Agree	5	62.5
6. I know how to add alternative text to images and other non-text items on a web page.		
Strongly Disagree	0	0
Disagree	0	0
Undecided	1	12.5
Agree	2	25
Strongly Agree	5	62.5
7. I am able to use CSS to modify the visual style of the pages within my school's site.		
Strongly Disagree	0	0
Disagree	0	0
Undecided	3	37.5
Agree	1	12.5
Strongly Agree	4	50

Scale: 1 = *Strongly Disagree*, 5 = *Strongly Agree*.

Table 6 (continued).

Survey Question	Frequency	Percentage
8. I always check my website for compatibility using at least three different browsers.		
Strongly Disagree	1	12.5
Disagree	2	25
Undecided	1	12.5
Agree	3	37.5
Strongly Agree	1	12.5
9. I am familiar with the most common screen resolutions being used by visitors to my site.		
Strongly Disagree	0	0
Disagree	1	12.5
Undecided	2	25
Agree	3	37.5
Strongly Agree	2	25
10. I know how to conduct a usability test and am able to use the results to help me modify my site.		
Strongly Disagree	1	12.5
Disagree	2	25
Undecided	1	12.5
Agree	3	37.5
Strongly Agree	1	12.5
11. My school has looked at the possibility of creating a mobile version of our site.		
Strongly Disagree	0	0
Disagree	2	25
Undecided	4	50
Agree	2	25
Strongly Agree	0	0
12. I know of at least one online service that could assist me in the creation of a mobile website.		
Strongly Disagree	2	25
Disagree	1	12.5
Undecided	2	25
Agree	2	25
Strongly Agree	1	12.5

Scale: 1 = *Strongly Disagree*, 5 = *Strongly Agree*.

Table 6 (continued).

Survey Question	Frequency	Percentage
13. I can describe at least one major difference between the web browsers used by both the iPhone and Android operating systems.		
Strongly Disagree	0	0
Disagree	1	12.5
Undecided	2	25
Agree	4	50
Strongly Agree	1	12.5
14. I know how to collect and analyze data about the traffic to my school's site.		
Strongly Disagree	1	12.5
Disagree	1	12.5
Undecided	1	12.5
Agree	4	50
Strongly Agree	1	12.5
15. I am able to use the HTML header to identify the browsers being used by visitors to my school's site.		
Strongly Disagree	1	12.5
Disagree	2	25
Undecided	0	0
Agree	4	50
Strongly Agree	1	12.5

Scale: 1 = *Strongly Disagree*, 5 = *Strongly Agree*.

Overall, participants rated themselves as knowledgeable about the general principles of design for the mobile web. Questions 11-15 asked about their knowledge of mobile web design, and while participants did not give these questions the highest scores, there were relatively few negative responses. In response to Question 13, for example, only 12.5% of those surveyed were unable to name at least one major difference between the web browsers used by both the iPhone and the Android operating systems. A total of 62.5% of participants went on to give positive responses to questions 14 and 15, indicating that they had knowledge about topics such as analyzing web usage data and

using the HTML header to identify the different browsers being used by visitors to their school's site.

Questions 1 - 5 asked about participants' knowledge of web design, and questions 6-10 asked about their knowledge of existing web standards. Responses to these questions revealed an interesting contradiction. While many participants were confident with those questions dealing with their knowledge of web design or existing web standards, most felt that they had not been adequately prepared to serve as their school's webmaster. In response to Question 1, for example, only 37.5% of respondents agreed that their undergraduate work had prepared them to serve as their school's webmaster. Responses to Question 2 were similarly negative, with only 12.5% of respondents agreeing that they were satisfied with the professional development opportunities that had been provided to assist them with their duties. Table 7 presents the participants' responses to each survey question in order from most positive to most negative responses.

Table 7

Survey Responses in Order from Highest to Lowest

Survey Question	Mean	Std. Deviation
6. I know how to add alternative text to images and other non-text items on a web page.	4.50	.756
5. I am able to use HTML to help me troubleshoot problems with my site.	4.38	1.061
4. I am able to use image editing software like Photoshop to assist me with the design of my school's website.	4.38	.744
3. I am comfortable with the software that I use to maintain my school's website.	4.25	1.165

Scale: 1 = *Strongly Disagree*, 5 = *Strongly Agree*.

Table 7 (continued).

Survey Question	Mean	Std. Deviation
7. I am able to use CSS to modify the visual style of the pages within my school's site.	4.13	.991
9. I am familiar with the most common screen resolutions being used by visitors to my site.	3.75	1.035
13. I can describe at least one major difference between the web browsers used by both the iPhone and Android operating systems.	3.63	.916
14. I know how to collect and analyze data about the traffic to my school's site.	3.38	1.302
15. I am able to use the HTML header to identify the browsers being used by visitors to my school's site.	3.25	1.389
8. I always check my website for compatibility using at least three different browsers.	3.13	1.356
10. I know how to conduct a usability test and am able to use the results to help me modify my site.	3.13	1.356
11. My school has looked at the possibility of creating a mobile version of our site.	3.00	.756
12. I know of at least one online service that could assist me in the creation of a mobile website.	2.88	1.458
1. My undergraduate (or graduate) work prepared me with the technological skills that I needed to serve as my school's webmaster.	2.50	1.309
2. I am satisfied with the professional development opportunities that have been provided to me since I began serving as my school's webmaster.	2.38	.916

Scale: 1 = *Strongly Disagree*, 5 = *Strongly Agree*.

Summary

This study found no relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's website. Analysis of the data likewise revealed no relationship between the availability of a mobile version of a website and the frequency with which that site is accessed.

While results from the current study do not indicate a significant relationship, many of the correlations that were computed for Research Question 1 represent a large effect size which would suggest that the lack of significance might be linked to the small sample size.

The survey revealed that high school webmasters are generally knowledgeable about the principles of mobile web design, but that they are dissatisfied with the amount of training that they received to help prepare them to serve in that capacity. In Chapter V, the researcher will draw conclusions, talk about the implications of this study, and make recommendations for future research.

CHAPTER V

SUMMARY/DISCUSSION

Introduction

The purpose of the study was to determine whether or not there existed a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access that school's web site. A further goal of the study was to examine high school webmasters' knowledge of web design. The study also sought to examine the effectiveness of implementing a mobile version of a website in order to make the content accessible to a wider audience. In Chapter V, readers will be presented with an overall summary of the study, conclusions to be drawn from its results, and recommendations for future research on this topic.

Summary of Procedures

Statement of the Problem

There exists a substantial volume of research suggesting a direct correlation between increased levels of parental involvement and student success which remains in place regardless of gender, socio-economic status, or ethnicity (Epstein, 2010; Epstein et al., 2011; Henderson & Mapp, 2002; Henderson et al., 2007). Modern communications technologies have made available to educators an unprecedented array of tools to facilitate ongoing efforts at increasing parent involvement in the school. Researchers have shown that mobile communications technologies are an effective means of communication which have the potential to reach across both racial and socio-economic boundaries (Crisp, 2009; Seal, 2011).

In spite of this clear potential, schools have done a poor job of using technology to promote the kinds of parental involvement that have been linked to increased academic performance. Educators have simply failed to embrace the kinds of emerging mobile technology that would seem tailor-made for such a task (Allen, 2012; Lenhart et al., 2010; Sternberg et al., 2007; Wei & Wang, 2010). The time has come for schools to re-examine the manner in which they approach the use of the most modern forms technology in their efforts to increase meaningful stakeholder communication.

Statement of Purpose

There is a great deal of research into the use of technology as a tool to facilitate increased parent communication, but very little of that research has focused on identifying ways in which schools might make use of cell phones to promote and facilitate increased parental involvement. This research study represents an effort to bridge the existing gap; its purpose was to determine whether or not there exists a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access that school's web site. A further goal of the study was to examine the effectiveness of implementing a mobile version of a website in order to make the content accessible to a wider audience. The study also sought to examine high school webmasters' knowledge of web design.

Study Design

This research study made use of a quasi-experimental and quantitative design to study four different variables. Those variables included the socio-economic make-up of a school, the manner in which users access the school's website, and the frequency with which the school's website is accessed. The independent variables were the socio-

economic make-up of each school and the availability of a mobile version of a school's website. The dependent variables were the manner and frequency with which the school's site was accessed. The researcher also collected descriptive data about each webmaster's knowledge of both mobile and traditional web design.

In order to measure the socio-economic make-up of each of the schools being studied, the researcher used data on the percentage of students who qualified for the free and reduced lunch program. Information about the manner and frequency with which stakeholders accessed school websites was collected anonymously using Google Analytics Tracking Code.

The researcher used correlational procedures to determine if there is a relationship between the socio-economic make-up of a school and the frequency with which users access the school's website using mobile devices. The researcher then conducted a repeated measures ANOVA to determine if the availability of a mobile version of a website significantly increases the frequency with which users access that site using mobile devices.

The researcher also distributed a survey to collect descriptive data about the webmasters at each of the schools within the district. The survey was developed with the assistance of an expert in the field of professional web design and included questions designed to gather information about each webmaster's knowledge of web design, their knowledge of web standards, and their knowledge of the principles of mobile web design. The expert assisting with the creation of the survey was at that time employed as a full-time web designer.

Conclusions and Discussion

RQ1. Is there a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web is used to access the school's web site?

Analysis of the data failed to indicate a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web was used to access the school's website. Such a finding is surprising, given the volume of literature that seems to indicate an inverse relationship between socio-economic status and the use of both cell phones and the mobile web. Recall that when the Pew Research Center (Smith, 2011) conducted research on the number of cell phone owners who used their phone as their primary source of Internet connectivity, data revealed that 25% of smartphone owners used their phone in this manner. Recall too, that another report from the Pew Research Center (Smith, 2010) revealed that cell phone usage by ethnic minorities has officially eclipsed that of White Americans.

These facts are important because those same subgroups account for an overwhelming majority of Americans currently living in poverty (University of Michigan, 2012). Data from the most recent U.S. census showed that a total of 12.4% of Whites under the age of 18 were living in poverty, compared with 38.2% of Blacks and 35% of Hispanics (Walt, Proctor, & Smith, 2011). Indeed, data indicate that teens from low-income families are even more likely to use their cell phones to access the Internet. In one study, researchers found that 21% of teens with no other access to the Internet reported using a cell phone to go online (Lenhart et al., 2010).

While analysis of the data that were collected failed to indicate a significant relationship between the socio-economic make-up of a school and the frequency with which the mobile web was used to access the school's website, the researcher would emphasize that an overwhelming majority of the correlations that were computed represent a large effect size. Of the 33 correlations that were computed, a total of 29 were .40 or larger in size. In addition, it should be noted that while the researcher set the significance level for this study at $p < .05$, both the non-mobile average and the overall average began to approach this level. While the study failed to reach the established level of significance, the presence of such a large effect size remains noteworthy. This study's sample size was limited to only 10 schools, and although the resulting lack of power makes it difficult to generalize, it seems possible that a larger sample size might have revealed a significant relationship.

Such a result would be largely in keeping with previous research that has demonstrated such a nexus between the socio-economic status of families and the degree to which they communicate with the school. Hill and Taylor (2004) reported that low-income parents were less likely to be involved with the school than were parents with higher incomes, and Bouffard (2006) found that parents from lower socio-economic backgrounds were less frequently involved in education than were parents from higher socio-economic backgrounds. Bouffard underscored the fact that this lack of involvement was particularly evident in terms of the amount of communication that took place between the home and the school.

RQ2. Does the availability of a mobile version of a website significantly increase the frequency with which that site is accessed?

This study failed to indicate a significant relationship between the availability of a mobile version of a website and the frequency with which that site is accessed. While such a result would at first seem to run counter to previous research indicating both a rise in cell phone use and an industry-wide emphasis on mobile design, analysis of the data pertaining to this second research question gave no indication that the availability of such a site made any difference in how frequently users visited the school's site over the course of the two week data collection period.

It is not immediately clear why this should be so. A growing body of research leaves little doubt that an increasing number of Americans are using their cell phones to access content on the Internet. In fact, if recent studies are to be believed, the growth rate is nothing short of staggering. One FCC report revealed that by the end of 2010, the number of people with mobile Internet subscriptions had increased by 63% over the previous years' numbers (FCC, 2011). Smith (2010) reported on a similar study showing a 32% increase in the number of people who reported having used their cell phone to access online content so during the previous year. Even more striking is the fact that a growing segment of the population seems to be relying on the cell phone as their primary source of connectivity. The Pew Research Center (Smith, 2011) recently revealed that 25% of smartphone owners reported using their phone in such a manner.

Research shows an industry-wide push to design online content that is tailored to meet the needs of mobile users. Krug (2005) talked about the importance of making sure that design elements worked together so that end-users are presented with the most enjoyable browsing experience, and other experts have echoed this emphasis on including the needs of mobile users during the website design process (Fox, 2008). Indeed, it is

possible that the simplest explanation for this study's failure to find a significant relationship might be the *researcher's* failure to take all of the necessary design elements into consideration during the creation of the mobile site that was used to test the hypothesis. Ankerson (2010) was quite candid when she talked about the increasingly complex nature of the requisite web design skill-set. The researcher makes no claims that the mobile site designed as a part of this study would hold up to careful scrutiny by a professional that specialized in mobile web design, and it is possible that a professionally-designed mobile site might have made more of an impact on visitors to the school's site.

Irrespective of such an argument, the researcher would suggest that there exists at least one other explanation which might help to explain the results of this study. This alternate explanation is couched in the fact that the current focus on either mobile or non-mobile web design fails to address the quality of the *content* that is contained within the websites being discussed. Readers will recall that a variety of researchers have reported on the most common parent complaints about school websites. In some instances, parents have been critical of the inconsistent updates to online content, while in others, they have voiced disappointment with how difficult it was to find contact information for their children's teachers (Beeman, 2008; Eggeman, 2008). Algozzine et al. (2006) suggested that while most schools did a good job of creating well-designed sites, most failed to take the requisite next step of working to use those sites to create an ongoing dialogue with stakeholders. In the context of the second research question, the researcher would suggest that the actual content of a school's site matters a great deal more than the manner in which it is delivered to the end-user.

RQ3. To what extent are current high school webmasters knowledgeable about the design of mobile websites?

The webmaster survey included a variety of questions dealing with web design, and participants' responses to those questions revealed an interesting contradiction. Even though most webmasters reported a certain degree of confidence in their web design skills, many also reported that they did not feel that they had been adequately prepared to serve as their school's webmaster.

These results are in line with previous research. While Algozzine et al. (2006) were critical of the ways in which many schools used their websites, they did concede that "...the vast majority of high schools appropriately addressed web design issues" (p. 57). Tubin and Klein (2007) went on to point out that many districts choose to incorporate pre-designed templates into their web design efforts, and it seems likely that such templates usually do at least an adequate job of living up to modern standards for functional web design.

Other studies validated participants' feelings about inadequacies in the way they had been prepared to serve in the role of webmaster. Angle (2010) confirmed that many teachers were unable to stay up-to-date with the seemingly endless variety of recent technological tools. Camerino (2009) echoed this concern and suggested that teachers were frequently reluctant to try new things even after they had received training.

In addition to the details that have already been discussed, there is one remaining element from the survey data which stands out as particularly interesting and which may help to place the current discussion into the larger context of the true role of the school webmaster. Question 11 on the webmaster survey asked respondents if their school had

ever looked at the possibility of creating a mobile version of their website. Because the survey was only distributed to teachers who were currently serving as their school's webmaster, it is striking that fully half of the respondents indicated that they did not know whether or not this discussion had ever taken place. Responses from the remaining participants were equally divided, and none of those responses reflected strong feelings either way.

Researchers have identified a variety of shortcomings associated with the ways in which schools use the web, but the most common complaint is directed at their inability to effectively use this new medium to really engage stakeholders in a meaningful manner. The researcher would suggest that the lackluster response to Question 11 speaks directly to this failure. While researchers seem to agree that webmasters are doing a good job of creating a basic presence on the Internet for their schools, there is a very real possibility that many are not doing a good enough job of engaging school leaders in meaningful discussion about how this powerful new medium can best be used to reach out to students and parents. And until these kinds of meaningful discussions begin to take place, there can be very little hope that schools will ever unlock the true potential of this exciting new tool.

Limitations

There were limitations to this study which may have impacted its outcome. All of the data that were collected came from a single school district in the southeastern United States. While the school district participating in the research was comprised of 116 schools, the researcher made the decision to collect data only at the high school level; the district being studied further limited the scope of the research to only 10 high schools.

The small sample size resulted in a corresponding lack of power in the correlational results.

Recommendations for Policy and Practice

The results of this research study have led to the development of a number of recommendations that might assist school leaders in their ongoing efforts to facilitate increased parent involvement. These recommendations are aimed primarily at building-level principals and administrators. They are equally relevant to other educators who serve in any type of building leadership capacity.

To begin, it is imperative that school leadership teams have an awareness of the growing trends in online connectivity. As schools work to identify ways in which they might make better use of cell phones to promote parental involvement, their efforts must be grounded in the most up-to-date research on how these kinds of technologies are really being used. While this study failed to produce any significant results in relation to the research questions that were posed, existing research has clearly established that the American population is increasingly reliant on the Internet as a means of accessing information. Statistics focusing on the growing use of the mobile web by some of the most at-risk segments of the population only serve to underscore how important it is that school leaders begin to take serious and well-thought-out steps to harness the power of these new technologies. Moving forward, schools need to reach out to both parents and students in an effort to better understand the ways in which mobile technology might best meet the needs of all involved.

In addition, as more and more educational leaders begin to include online technology in their school improvement planning, they should take care to include

webmasters in the ongoing discussion. While researchers have shown that the Internet can be a truly formidable tool for enhancing stakeholder communication, so too have they shown that it takes a great deal of planning and forethought to unleash its true potential. The results of this study underscored the importance of involving school webmasters in such a discussion, and it seems unlikely that the mobile web's true potential will ever be realized if those people who are most knowledgeable about its use are not included as members of the school improvement planning teams who are making the decisions about how it will be used to reach out to students and their families.

Finally, as important as it is to include teachers in the school improvement planning process, it is absolutely crucial that schools also make an effort to reach out to parents. School leaders should likewise make a concerted effort to engage parents in a dialogue about the ways in which technology might effectively help them to become more involved. No matter how schools decide to use technology, it is ultimately the skill with which educators can facilitate this dialogue with parents that will determine the outcome of their school improvement efforts.

Recommendations for Future Research

Future research should focus on expanding the sample size of this study. It would also be beneficial for future researchers to work to replicate the study across a broader area of either the state or the country. Efforts might also be made to repeat the study at either the elementary school level, the middle school level, or both. Free and Reduced Price lunch data is readily available, and the use of Google's Analytics Code greatly facilitates the collection of large amounts of data. Future researchers might also seek to

survey parents and students about their use of cell phones to access educational content on the Internet.

Concluding Remarks

The link between increased parental involvement and academic performance has been well established, and researchers have shown that it persists across boundaries of race, socio-economic status, and gender. Research has also shown the potential for technology to transform the school's efforts to engage parents in the educational process. While this study did not produce any significant results, data would seem to indicate the likelihood that future research might uncover a possible link between socio-economic status and the use of the mobile web to access educational content on the Internet. There is no doubt that Americans use the Internet at an ever increasing rate, and the rise in popularity of the Internet-connected cell phone only serves to underscore the importance of this now ubiquitous technology. As educators seek to make a positive impact on the lives of students, this new technology must be a part of the way forward. School leaders must embrace this new paradigm and use it to enhance their ongoing efforts to draw more parents into the discussion about how to educate the children of America.

APPENDIX A
WEBMASTER SURVEY

Dear Webmaster,

I am currently enrolled as a Ph.D. student at the University of Mississippi. My dissertation examines the use of the school website as a means of increasing parental involvement at the high school level. As a part of my study, I am collecting descriptive information from current school webmasters.

I would very much appreciate it if you would be willing to respond to the questions included on this survey. Please do not write your name on this survey; all information is anonymous.

<p style="text-align: center;">Years of Webmaster Experience:</p> <p style="text-align: center;"> <input type="checkbox"/> 1-5 <input type="checkbox"/> 6-10 <input type="checkbox"/> 11-15 <input type="checkbox"/> 16-20 <input type="checkbox"/> 21-25 </p>
--

Please answer the questions below. Circle the response that most closely describes your feelings. Choices include strongly disagree (SDA), disagree (DA), undecided (U), agree (A), and strongly agree (SA).

Questions:	SDA	DA	U	A	SA
1. My undergraduate (or graduate) work prepared me with the technological skills that I needed to serve as my school's webmaster.	1	2	3	4	5
2. I am satisfied with the professional development opportunities that have been provided to me since I began serving as my school's webmaster.	1	2	3	4	5
3. I am comfortable with the software that I use to maintain my school's website.	1	2	3	4	5
4. I am able to use image editing software like Photoshop to assist me with the design of my school's website.	1	2	3	4	5

Questions:	SDA	DA	U	A	SA
5. I am able to use HTML to help me troubleshoot problems with my site.	1	2	3	4	5
6. I know how to add alternative text to images and other non-text items on a web page.	1	2	3	4	5
7. I am able to use CSS to modify the visual style of the pages within my school's site.	1	2	3	4	5
8. I always check my website for compatibility using at least three different browsers.	1	2	3	4	5
9. I am familiar with the most common screen resolutions being used by visitors to my site.	1	2	3	4	5
10. I know how to conduct a usability test and am able to use the results to help me modify my site.	1	2	3	4	5
11. My school has looked at the possibility of creating a mobile version of our site.	1	2	3	4	5
12. I know of at least one online service that could assist me in the creation of a mobile website.	1	2	3	4	5
13. I can describe at least one major difference between the web browsers used by both the iPhone and Android operating systems.	1	2	3	4	5
14. I know how to collect and analyze data about the traffic to my school's site.	1	2	3	4	5
15. I am able to use the HTML header to identify the browsers being used by visitors to my school's site.	1	2	3	4	5

APPENDIX B
IRB APPROVAL



INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **13021501**
PROJECT TITLE: **The Relationship between Socio-Economic Status and the Frequency of School Web Page Access to Both Mobile and Non-Mobile Sites**
PROJECT TYPE: **Dissertation**
RESEARCHER(S): **Richmond Parker**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Educational Leadership & School Counseling**
FUNDING AGENCY/SPONSOR: **N/A**
IRB COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **04/02/2013 to 04/01/2014**

Lawrence A. Hosman, Ph.D.
Institutional Review Board

APPENDIX C
DISTRICT APPROVAL



COBB COUNTY
SCHOOL DISTRICT

Empowering Dreams for the Future

P.O. Box 1088
Marietta, GA 30061
Telephone: (770) 426-3300
www.cobbk12.org

February 15, 2013

Mr. Richmond Parker
2721 Idlewood Drive
Marietta, GA 30062

Dear Mr. Parker:

Your research project titled, The Relationship Between Socio-Economic Status and the Frequency of School Web Page Access to Both Mobile and Non-Mobile sites, has been approved. Listed below are the schools where approval to conduct the research is complete. Please work with the school administrator to schedule administration of instruments or conduct interviews.

School

Allatoona High
Harrison High
Hillgrove High
Kell High
Kennesaw Mountain High
Lassiter High
McEachern High
North Cobb High
Pebblebrook High
South Cobb High
Sprayberry High

Should modifications or changes in research procedures become necessary during the research project, changes must be submitted in writing to the Academic Division prior to implementation. At the conclusion of your research project, you are expected to submit a copy of your results to this office. Results cannot reference the Cobb County School District or any District schools or departments.

Research files are not considered complete until results are received. If you have any questions regarding the process, contact our office at 770-426-3552.

Sincerely,

Melissa Morse
Director of C-STEM, Assessment & Research

BOARD OF EDUCATION

Randy Scamihorn, *Chair* • Brad Wheeler, *Vice Chair*
Tim Stultz • David Morgan • Kathleen Angelucci • David Banks • Scott Sweeney

SUPERINTENDENT


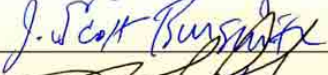


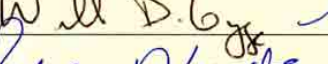

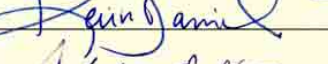


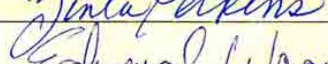
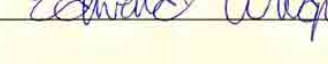
Michael Hinojosa, Ed.D.

APPENDIX D

DISTRICT PRINCIPALS' SIGNATURES

**Cobb County School District
Principal Agreement to Participate Form**

I have reviewed the Application for Research Project entitled "The Relationship Between Socio-Economic Status and the Frequency of School Web Page Access to Both Mobile and Non-Mobile sites." by Richmond Parker and agree that our school will participate, subject to the researcher's compliance with district policies and procedures.

<u>Principal Signature</u>	<u>School Name</u>	<u>Date of Approval</u>
	North Cobb HS	1-14-2013
	Allatoona	1-14-2013
	Hellgram	1/14/13
	Cassiter HS	1/14/13
	HARRISON	1/14/13
	McEachern	1/16/13
	Kennesaw Mountain	1/16/13
	South Cobb Hi S.	1/17/13
	Spreyden H.S.	1-20-13
	PEBBLEBROOK	2/13/13
	Kell H.S.	2/13/13

The completed, original form should be returned to Melissa Morse in the Academic Division. Upon successful completion of this form, final approval will be provided to the researcher in writing.

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