

AN EVALUATION OF FAMILIAL INVOLVEMENTS' INFLUENCE ON STUDENT
ACHIEVEMENT IN K-12 VIRTUAL SCHOOLING

By

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To my wife Nicole

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Chair: Richard E. Ferdig
Cochair: Kara Dawson
Major: Curriculum and Instruction

Virtual schooling is fast becoming a mainstream option for today's generation of learners. Greater numbers of students and parents are demanding access to distance education opportunities, increasing the amount of public funding allocated to. While virtual schooling at the K-12 level has grown in popularity, research-based investigations into successful teaching, learning and student support processes are limited. There are guidelines and standards for instructional practices in online settings, mainly produced by leading organizations in teaching and learning, including The American Federation of Teachers, Sloan-C, American Distance Education Council, Southern Regional Educational Board, National Education Association, and the North American Council for Online Learning. However, most guidelines remain non-empirical adaptations of face-to-face practices, whose primary focus is on guidelines for course development and pedagogical practice.

There is reason to believe that the role of familial involvement in virtual schooling could be as important, if not more important than its role in traditional schooling. Unfortunately, contemporary studies on parental involvement only address face-to-face student populations. Therefore, the study of parental involvement and its relationship to virtual school student

achievement could assist the development of new communication strategies between virtual schools, teachers and parents that will lead to improvement in student achievement.

The purpose of this study is to investigate the role of familial participation in student's achievement in K-12 virtual schools. To address this question, this study employed an online survey adapted from research by Hoover-Dempsey and Sandler, sampling parents from a virtual school in the Southeastern U.S. Quantitative statistical procedures were utilized to analyze the resulting data.

Outcomes indicate that parent-student interactions do have predictive effect related to student achievement, parents and students differ in their perceptions of each other's involvement in the academic process, and demographic variables such as gender and socioeconomic status affect the level of parental involvement perceived by students. Implications related to these findings can be used to increase the effectiveness of homeschool communications, develop comprehensive communications policies for virtual school employees, develop and deliver instructional materials for parents in order to promote efficacious interaction with their children regarding academic work and develop a broader understanding of the ancillary environment associated with virtual school students.

CHAPTER 1 INTRODUCTION

Background

The United States (US) has experienced an unprecedented growth in both the availability and participation in online education programs. At present, there are over 3.2 million online students at the college and university level (Allen & Seaman, 2007) and over 96 percent of the very largest higher educational institutions have online course offerings (Allen & Seaman, 2006). At the K-12 level, over 1,000,000 students participate in online learning (Watson, Gemin & Ryan, 2008); by 2010, this number is expected to double (Tucker, 2007). At the end of 2002, only 12 states had significant online learning programs (Kozma & Zucker, 2003). Now 44 states have taken the initiative to create online offerings. This number reflects the extraordinary need for online learning (Watson, Gemin & Ryan, 2008). An active body of researchers is engaged in studies to identify best practices and insight into how to best support and promote online students success. Research by Watson and Ryan (2007) reveals that virtual schools are focused on the development of successful practices in a myriad of areas, including: teacher professional development, student teacher communication, student services, data management and course development. One area of research that has not received adequate attention is the effect that parental involvement has on student achievement in virtual schools.

Several virtual schools collect data from parents, utilizing the information to ascertain an understanding of parental attitudes toward virtual schooling and curriculum. Unfortunately, there are no published studies that empirically investigate this impact (Russell, 2004; Black, Ferdig & DiPietro, 2008).

A better understanding of factors related to online student achievement is of critical importance to K-12 online education (NCREL, 2002). Parental involvement is seen as a key

component of other non-traditional forms of education, including charter schools and home schooling (Green & Hoover-Dempsey, 2007; Bulkley & Fisler, 2003). Online learning and traditional schooling have both shared and unique factors and components that affect student achievement (DiPietro, 2008; Ferdig, DiPietro, Papanastasiou, 2005; Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004; Mills, 2003; McConnell, 2000). Research by Roblyer and Marshall (2003) has identified several psychological factors necessary for academic success in online environments; these factors include: technological skills, self-discipline, time-management skills, internal locus of control, self-esteem, responsibility and achievement motivation. The physical presence afforded by the teachers and the classroom has a critical impact on the development and shaping of these factors (Harter, 1996). Given the lack of physical presence of the teacher inherent to online learning, it remains to be determined how to best provide the support to keep online learners focused on assigned tasks. In light of the proximity issue associated with online learning, and the relative uncertainty regarding face-to-face educational practices that transfer into an online learning environment, the assumption that the effects of parental involvement on student achievement in online learning will be similar to those found in tradition schooling cannot be made.

Family involvement has been recognized as an intangible ideal that can be connected to a large number of activities that focus on a relationship between the home and the school (Sy, Rowley & Schulenberg, 2007). Familial participation in student learning in traditional schooling environments has a positive relationship with student achievement, attendance and pro-social behaviors (Henderson, 1981, 1987; Anderson, Hiebert, Scott & Wilkinson, 1985; Cotton & Reed-Wikelund, 1989; Edwards, 2004). This relationship has held considerable appeal to school administrators, politicians, parents and students. Thus a considerable body of research has

developed to explore the role of the family and its effects on students' academic achievement (Christenson, Rounds & Gorney, 1992; Epstein, 1991; Keith, 1991; National Center for Education Statistics [NCES], 1997).

It is essential that a better understanding of the role of the parent with regards to virtual school achievement be developed. Understanding the impact that family involvement contributes to student learning is a critical element to discerning factors that promote student success in online learning environments and a primary concern of virtual school educators and leaders. The purpose of this dissertation is to investigate the role of familial participation in students' achievement in K-12 virtual schools.

Defining Family Involvement

Family involvement is an abstract ideal associated with a multitude of behaviors and interactions that focus on a relationship between the home and the school (Sy, Rowley & Schulenberg, 2007). The homeschool relationship typically involves several different types of involvement: family involvement, parent involvement, parent education and family-school partnerships (Edwards, 2004). Differing ideas about the role of the involved family reflect the many social strata and structures in the U.S. (Morrow, 1989; Brito & Waller, 1994; Seely, 1981; Grolnick & Slowiaczek, 1994). It is further purported that cultural identity affects the role and type of parental involvement (Sy, Rowley & Schulenberg, 2007; Kerbow & Bernhardt, 1993; Mau, 1997; Yao, 1985). Rather than differentiating between the multiple typologies, Edwards (2004) uses the term *family involvement* as an omnibus expression. Edwards describes the term as “broad enough to encompass the radical change undergone in what constitutes a family and the roles and responsibilities in the lives of the adults who nurture the children in today’s schools (p.11).” For the purposes of this study, the term family involvement or parental involvement will

be limited to the involvement of biological parents or those placed in a guardianship role as supervisors of a student enrolled in a virtual school.

Successful family involvement is indicated by the process of helping parents and family members use their abilities to simultaneously benefit themselves as well as their children (Edwards, 2004). By adopting an Edwardian understanding of family involvement it can be asserted that parental involvement could involve a multitude of different activities, some of which may not be associated with physical presence within a school (Sy, Rowley & Schulenberg, 2007).

The Role of Familial Involvement in Traditional Schooling

Research demonstrates that familial participation in students' learning has a positive relationship with student achievement (Anderson, Hiebert, Scott & Wilkinson, 1985; Cotton & Reed-Wikelund, 1989; Edwards, 2004). Family involvement in children's learning has been linked to higher achievement, enhanced conduct and attitude, and better attendance for students (Henderson, 1981, 1987; Kellaghan, Sloane, Alvarez, & Bloom, 1993; Henderson & Berla, 1994; Henderson & Mapp, 2002).

Research also indicates that early involvement by parents has a profound effect on the magnitude of educational outcomes. Early childhood education programs with strong parent involvement components have amply demonstrated the effectiveness of this approach (Ziegler, 1987; Schweinhart and Weikart, 1992).

Despite the significant body of research that exists addressing the role of the family in traditional schooling, much remains to be researched. For example, the relatively recent move from synchronous (telephone and parent-teacher conferences) to asynchronous communication methods (email, voicemail) between home and school has specific implications for how teachers and parents communicate (Bouffard, 2006); and the effect of familial involvement on specific

academic content areas remains an area with limited research (Fan & Chen, 2001). Additionally, the role of social and economic variables remains a source of considerable controversy (Lareau, 2000, 1989), as is the abject visibility of social class stratification in the nature of familial participation (DeCarvalho, 2000).

The Role of Familial Involvement in Virtual Schooling

Virtual schools provide students access to online educational opportunities that fulfill a need in the contemporary educational system by giving students access to learning (Joy & Garcia, 2000). Virtual schooling fills a distinctive role in the nation's education agenda by serving as an additional option for enacting school choice legislation (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004; NCES, 2005; Watson, Winograd, & Kalmon, 2004).

Several virtual schools collect data from families, including the Ohio Virtual Academy, Florida Virtual School and Kiel eSchool, but none focus their efforts on the specific roles that parents play with regards to virtual curriculum and student achievement. According to Clark (2001) and Rose and Gallup (2001), family attitudes regarding the validity of distance education will play an important role in the continued growth of the virtual school movement. Research by Cavanaugh et al. (2004) identified factors that influence the success of a distance education program, these factors include

- Abilities and disabilities of the student
- Quality of the teacher
- Demands of the content
- Design of the distance learning environment

Del Litke (1998), Russell (2004) and Black, Ferdig and DiPietro (2008) encourage future researchers to consider these factors and build upon them, specifically, to identify factors external to the student that influence student achievement, including the role of the family. Furthermore, Russell (2004) discusses the value of the parent from a non-empirical standpoint,

asserting that the family is a critical component of the virtual school dynamic and recognizing that there will be significant variance in the quality of familial support that students receive at home.

Del Litke's (1998) analysis of a Canadian virtual school program identified a general lack of communication between families and teachers, and identified supportive parents as a key component to virtual school success. Del Litke argues that the familial role in virtual schooling is more complex than the role the family plays in traditional schooling. Research by Russell (2004) asserts that a portion of the responsibility for a student's education is returned to the family in the virtual schooling model. Thus it is important that parents provide appropriate support to enable the timely completion of schoolwork, and appropriate use of an online computer at home or elsewhere.

A virtual school's lack of physical facilities may in fact provide an opportunity to promote more equitable involvement by families from a spectrum of social groups and strata. Parents differ by social class, race, and ethnicity in their access to schools and in their effectiveness in dealing with educators (Lareau, 1989; Lareau & Shumar, 1996; Wells & Serna, 1996). Parents from higher socioeconomic classes have more opportunity, as compared to those in lower classes, for school involvement, particularly when physical presence is required (McGrath & Kuriloff, 1999). Many virtual schooling models remove the time constraints typically associated with the traditional school day and the distance between parent and child, potentially making it easier for busy parents and other family members to engage in educational interactions with children (Kozma & Shank, 1998). Involved parents in traditional schools have an unintentional tendency to focus their efforts toward promoting advantages for their own children. This situation encourages school administrators to focus on the needs of those parents and families

who have high access to schooling, typically those from a higher socioeconomic stratum (McGrath & Kuriloff, 1999). Because of their lack of physical structure virtual schools may, in fact, contribute to a leveling of the playing field between social classes by effectively handicapping those with greater time availability and eliminating involvement opportunities that involve physical presence in the school.

Models of Parental Involvement

Several contemporary models of parental involvement are actively used by the research community writ large. Specific models focus on aspects of parental involvement associated with family school partnerships (Edwards, 2004); the quantification of a continuum for parent involvement (Cervone & O’Leary, 1982); the assertion that parental involvement is a form of social capital (Grolnick, Benjet, Kuriwski & Apostoleris, 1997); and the categorization of relationships between the home and the school (Epstein, 1995). Each of these models can be applied in a virtual school setting, though they do not focus on a measurable underlying psychology of the involvement activity (Franke, 2005). Rather, their focus is on actions. To gain a comprehensive understanding of the parental involvement construct and the psychological underpinnings of this construct within the context of virtual schooling, the Hoover-Dempsey and Sandler model (1995, 2005) of parental involvement was selected for this study. The model’s focus on the psychology of involvement provides for an ideal opportunity to explore parental involvement in a new domain, that of the K-12 virtual school (Fan & Chen, 2001).

Hoover-Dempsey and Sandler (1995) built upon the work of Eccles and Harold (1993) to discern motivations for parental involvement. They suggested that parental involvement is predicated upon “personal construction of the parental role, personal sense of efficacy for helping children succeed in school, and parental reaction to the opportunities and demand characteristics presented by both their children and their children’s schools” (p. 311). Armed

with the theoretical antecedents of involvement, Hoover-Dempsey and Sandler (1995) hypothesized that they could then discern the influence that involvement asserted upon student achievement.

Hoover-Dempsey and Sandler (1995) downplay, though do not marginalize, the prominence ascribed by researchers (eg: Lareau, 1989; Heymann, & Earle, 2000; Aughinbaugh, Pierret & Rothstein, 2005) to factors such as parents' education, income, marital status, and other indicators of family status in efforts to understand parents' involvement decisions. It is their assertion that these factors did not effectively explain parents' decisions to become involved, their choice of involvement forms, or the effects of their involvement on student outcomes.

According to Hoover-Dempsey and Sandler (1995) parents become involved in children's education based on three factors:

- The successful development of a personal construction of the parental role that includes participation in their children's education.
- The successful development of a positive sense of efficacy for helping their children succeed in school.
- The perception of opportunities for involvement from children and the school.

Parents then choose specific forms of involvement in response to the explicit domains of skill and knowledge they possess, the total demands on their time and energy, and specific requests for involvement from children and the school. The Hoover-Dempsey and Sandler model asserts that parental involvement then influences children's developmental and educational outcomes through such mechanisms as modeling, reinforcement, and instruction (Hoover-Dempsey, Battiato, Walker, Reed, DeJong, & Jones, 2001; Hoover-Dempsey & Sandler, 2005; Green & Hoover-Dempsey, 2007). The ultimate result of the Hoover-Dempsey/Sandler assertions is the framework represented in Figure 3, developed through empirical analysis by The Family School Partnership Lab at Vanderbilt University (2007). By drawing upon this theoretical

framework, it is possible to quantify beliefs that affect parental involvement and discern their relationships to student achievement in virtual schools.

Problem Statement

The role of familial involvement in virtual schooling could be as important, if not more important than its role in traditional schooling (Russell, 2004). Current research does not address the role of the family in online learning (Russell, 2004). This dissertation will investigate the role that familial involvement plays in achievement for virtual school students.

Significance

Virtual schooling is fast becoming a mainstream option for today's generation of learners (Watson, Gemin & Ryan, 2008). Virtual school administrations have seen fit to develop curriculum that addresses the broad range of students from K-12 (Clark, 2001). Greater numbers of students and parents are demanding access to distance education opportunities, increasing the amount of public funding allocated to providers (Black, Ferdig & DiPietro, 2008). While virtual schooling at the K-12 level has grown in popularity, research-based investigations into successful teaching, learning and student support processes are limited (Cavanaugh et al., 2004). Instructional practices for online settings and the guidelines and standards produced by leading organizations in teaching and learning, including The American Federation of Teachers (AFT, 2001), Sloan-C (Sloan-C, 2002), American Distance Education Council (ADEC, 2003), Southern Regional Educational Board (SREB, 2006), National Education Association (NEA, 2006), North American Council for Online Learning (NACOL, 2007-2008) remain non-empirical adaptations of face-to-face practices, whose primary focus is on guidelines for course development and pedagogical practice (DiPietro, Ferdig, Black & Preston, 2008). There is reason to believe that the role of familial involvement in virtual schooling could be as important, if not more important than its role in traditional schooling (Russell, 2004). Unfortunately, contemporary studies on

parental involvement only address face-to-face student populations. Therefore, the study of parental involvement and its relationship to virtual school student achievement could assist the development of new communication strategies between virtual schools, teachers and parents that will lead to improvement in student achievement.

Purpose

The purpose of this study is to investigate the role of familial participation in student's achievement in K-12 virtual schools.

Research Questions

The following questions frame the research:

- What quantifiable impact, if any, does familial involvement have on student achievement in K-12 virtual schooling?
- Do students and parents differ in their perceptions of familial involvement in K-12 virtual schooling?
- Do factors including, socioeconomic status, race and gender, effect involvement of families in virtual schooling?

CHAPTER 2 REVIEW OF LITERATURE

Introduction

Parental involvement has been identified as a critical component of student achievement in traditional schooling environment. Several researchers have suggested that parental involvement is of importance to K-12 virtual schooling (Clark, 2001; Johnston, 2004). It is tempting to assume the commonality between factors influencing achievement in traditional schooling environments and factors that influence virtual school achievement (Reeves & Nass, 1996). Unfortunately, there are no published studies that empirically investigate the impact of this type of involvement on student achievement (Russell, 2004; Black, Ferdig & DiPietro, 2008). An experimentally based understanding of the role of the parent with regards to virtual school achievement is an important research component that will shape the future of K-12 virtual schooling in the U.S. Understanding the impact that family involvement contributes to student learning is a critical element for discerning factors external to the school environment that promote student success in virtual schooling.

The goal of this chapter is to explore the current state of virtual school research by establishing it within the context of existing research that explores family involvement and its impact on students' academic achievement. This chapter is organized into five sections, the first of which will introduce K-12 virtual schooling and research related to achievement. The second section discusses research underlying the foundation of contemporary notions of family involvement in U.S. public education. The third section discusses research related to family involvement in virtual schooling. The fourth section addresses the theoretical model developed by Hoover-Dempsey and Sandler (2005) and the final section provides a summary of the chapter.

This review of literature will function to establish a context for virtual schooling and provide a basis for discussing the role of the parent in virtual student achievement.

An Overview of Virtual Schooling in the US

Moore and Kearsley (1996) define distance education as: “planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements” (p.2).

Distance education has a rich history in the United States and internationally as a form of instruction for both children and adults. Virtual high schools constitute a relatively recent addition to the broader concept of distance education. These schools are an evolutionary offshoot of correspondence programs, which have facilitated distance education practices since the 1870s (Yates, 2003). Distance learning programs provide a complementary opportunity for those not able to attend traditional learning environments and have played a role in the education of disparate populations, including displaced individuals, the active-duty military and those serving sentences in state and federal prison systems (Keegan, 1996). These programs, dependant upon the prevalent communications technology available to the public, have relied on multiple communication mediums, including postal, radio and uni-directional video to reach their audience (Keegan, 1996). With the widespread adoption and mainstreaming of the Internet in the 1990s, many distance learning programs, lead first by universities, looked to the Internet as an efficient medium for instruction (Roblyer, 1999). Today, the Internet is a principal component of distance education, resulting in a morphing of terminology in which distance education has now come to be termed online or virtual education.

The first online K-12 public school began in 1995 with the Cyber School Project in Eugene, Oregon. This program was started by nine teachers to offer supplemental high school

classes (Greenway & Vanourek, 2006). By 1996, there were three online schools: the WebSchool in Orange County, Florida (later renamed as Florida Virtual School); The Cyber-School Academy, started by the Federal Way School District in the state of Washington; and the Concord Virtual High School (later renamed as Virtual High School) based in Maynard, Massachusetts (Greenway & Vanourek, 2006).

From 1996 to 2002, just twelve different state departments of education started virtual high schools in their respective states (Zucker & Kozma, 2003). However, by October, 2008, 44 states had established state-led online learning programs (Watson, Gemin & Ryan, 2008). Based on a comprehensive survey of school administrators, the Sloan Consortium estimates that more than 1,000,000 K–12 students participated in online learning during the 2007-2008 school year. Greater than half of the administrators responding to the Sloan survey (57.9 percent) reported members of their student body participating in online courses during 2005–06 (Picciano & Seaman, 2007). Further, 25% of those without virtual school enrollees anticipated a need to enroll students in online courses within the next three years (Picciano & Seaman, 2007). The Sloan report supports Maeroff's (2003) prediction that distance education student populations in the K-12 setting, having already experienced double digit growth since 1996, will continue growing at double digit rates for the foreseeable future.

While many students utilize virtual schools to augment courses taken as part of a regular instructional program within a public school, a growing body of students is engaging in entirely online instruction and forgoing traditional classrooms all together (Clark, 2001). Unfortunately, due to data collection limitations inherent in the U.S. virtual schools, no accurate count of dual enrollment versus full-time enrolled students can be made (Black, Ferdig & DiPietro, 2008).

Motivations for establishing a K-12 online learning programs typically center on expanding course offerings to those unable to access due to geography, disability or lack of course offering (Watson & Ryan, 2007; Mills & Roblyer, 2004). A prime example of the appeal of virtual schooling is represented by students and parents requesting increased access to foreign language programs, such as Mandarin Chinese and Arabic. Given the shortage of qualified foreign language instructors with specific experience in these languages, online learning offers the opportunity for students to gain access to high quality instructors regardless of their geographic location and the limitations of the course offerings in their brick and mortar high school (Watson & Ryan, 2007; USDOE, 2007). K-12 virtual schools are seen as vehicles of school change and have become increasingly popular from a political standpoint at both the state and local level (Hassell & Godard-Terrell, 2004; Ferdig & Cavanaugh (eds), in press).

Virtual schools, similar to their brick and mortar counterparts, have been developed and implemented in many different formats. Several different administrative structures are presently practiced throughout the U.S., including, statewide supplemental programs, district-level supplemental programs, single-district programs, multidistrict cyberschools, and online charter schools (Rice, 2006; Watson, Winograd & Kaloman, 2004). Two characteristics define the aforementioned programs: whether the online program enrolls students and grants credit and diplomas directly and the jurisdictional level of the program (such as state or district) (Watson, et al., 2004).

States, including Florida, Michigan, Louisiana and at least 38 others have commissioned state or district/county sponsored virtual schools (Watson, & Ryan, 2007). Increasingly colleges and universities are offering advanced high school students the opportunity for dual enrollment utilizing the Internet to take college level courses while completing their high school degrees.

States and county regions have utilized economies of scale by building consortia to offer virtual schooling opportunities to students within their geographic localities (Hassel & Terrell-Godard, 2004). In addition, many public school systems have taken it upon themselves to offer virtual schooling opportunities to supplement educational needs and to reach out to homeschooled students (Hassel & Terrell-Godard, 2004). State-chartered schools and for-profit entities make up the final subset of the virtual schooling community (Clark, 2001). As increasing numbers of students and parents are demanding access to distance education opportunities, the amount of funding allocated to virtual schools has increased along with access. Given their numerous models and bureaucratic formats, virtual high schools cannot be easily nominalized as either an educational or technological phenomenon, though all rely on the Internet for student-instruction interaction (Roblyer, 1999).

Much of the research regarding the advantages of online learning has focused on collegiate and other adult populations. Some, but not all, of this research can be applied to K-12 populations. By utilizing a body of research from post-secondary populations accepted by the K-12 online research community writ large, in addition to research that focuses exclusively on K-12 online student, specific affordances of the medium can be discerned (Kiekel, 2007). Though virtual high schools, traditional schools can supplement the depth and breadth of their course offering without incurring the costs associated with infrastructure or increased staffing (Roblyer & Elbaum, 2000). Research indicates that online learning tends to facilitate greater individual student and teacher interactions (Meyer, 2003). Meyer (2003) and Weisgerber and Butler (2005) report that asynchronous mediums of instruction, most oft employed in present day K-12 virtual schooling (Watson & Ryan, 2007), promote a myriad of skills including, self discipline, sense of community, communication skills, and reflective capacity (Romiszowski & Ravitz, 1997;

Chickering & Ehrmann, 1996; Debard & Guidera, 1999-2000; Dutt-Doner & Powers, 2000).

Given the lack of physical presence associated with online learning, students who may not normally participate in traditional classroom settings often find themselves able to contribute in an online medium (Chong, 1998; Dutt-Doner & Powers, 2000). Asynchronous discussions allow students and teachers the opportunity for consideration and reflection upon postings resulting in the opportunity for rich discourse (Ferdig & Roehler, 2003). Twigg (2003) and Palloff and Pratt (1999) note that this style of discussion changes the fundamental role of the teacher, encouraging a more constructivist approach with students.

The concept of anytime, anywhere learning is an affordance of online instruction, in many instances, particularly those involving asynchronous online mediums, students have access the course 24 hours a day, seven days a week.

K-12 Virtual Schools and Student Achievement

Since their emergence and rapid growth, questions related to the efficacy of K-12 virtual schoolings have been raised by school administrators, policy makers, parents and students (Cavanaugh et al., 2004; Dickson, 2005). As such, researchers have spent considerable time and effort comparing achievement rates between virtual schools and their traditional counterparts. One of the earliest analyses conducted by Russell reviewed 355 studies, ultimately reporting no significant difference in achievement between online and traditional courses, but a wide variability in effect size (Russell, 1999). A second meta-analysis conducted by Bernard, Abrami, Lou, Borokhovski, Wade, Wozney, Wallet, et al. (2004) also confirm a net no significant difference. A more granular inspection of Bernard et als. reveals a large variance in effect sizes, from -1.31 to +1.41. These effect sizes indicate that while the average effect is indeed zero, groups of students excel in online learning environments and groups of students are clearly not succeeding in an online learning environment (Dickson, 2005).

The Cavanaugh et al. 2004 meta-analysis supports the Bernard et al. findings, where again, an average effect size of zero was found but a wide variance in effect sizes occurs (between -1.2 and .6). The Cavanaugh et al. results were based on 116 different effect sizes gathered from 14 different online K-12 programs. These three meta-analytic findings indicate that while there is indeed ‘no significant difference’ between student achievements in K-12 virtual schooling, there is a body of students whose achievement can be improved.

Family Involvement

Family involvement in schools is commonly recognized as an activity that has substantial benefit to those involved. Schools, students and parents all derive specific benefits from parental involvement (Comer & Haynes, 1991; Epstein, 2001; Fan, 2001; Henderson & Mapp, 2002; Jaynes, 2005). Research shows that children receive greater benefit the earlier the parent involvement process begins, though benefit can be derived for students at all grade levels regardless of gender or racial status of the children (Jaynes, 2005; Cotton & Reed-Wikelund, 1989).

Unfortunately, there is considerable debate when attempting to define parental involvement (Jaynes, 2005; Fan & Chen, 2001). Due to its multidimensional nature, defining family involvement proves to be a difficult task as the concept bridges many different activities and endeavors. This complexity makes it difficult to label and measure (Fan & Chen, 2001; McLaughlin, 2006). The No Child Left Behind Act of 2001 (White House, 2001) defines parent involvement in Sec. 9101(32) as the participation of parents in regular, two-way and meaningful communication involving student academic learning and other school activities including, ensuring:

- That parents play an integral role in assisting in their child’s learning;
- That parents are encouraged to be actively involved in their child’s education at school;

- That parents are full partners in their child’s education and are included, as appropriate, in decision making and on advisory committees to assist in the education of their child;
- The carrying out of other activities, such as those described in Sec. 1118.

Pat Edwards (2004) uses the term *family involvement* as “an omnibus expression recognizing the wide variety of parental behavioral patterns and practices” (p.11), congruent to ideals noted by Balli (1996) and Brown (1994). Edwards’s description is “broad enough to encompass the radical change undergone in what constitutes a family and the roles and responsibilities in the lives of the adults who nurture the children in today’s schools” (p.11). For the purposes of this study, the term family involvement or parental involvement will be limited to the involvement of biological parents, or those placed in a guardianship role, as supervisors or tenants of a student enrolled in a virtual school. After surveying the myriad of definitions associated with family involvement, McLaughlin (2006) recognized that the most descriptive and useful definitions of the term focus on the multiple dimensions of family involvement by conceptualizing and considering the behaviors from which family involvement is instigated. Drawing on several descriptive definitions, Epstein (1995) describes commonly accepted categories of family involvement to assist educators in the development of comprehensive school-family-community partnerships. Epstein’s theoretical model includes six types of homeschool relationships, they are: (1) Parenting: Promoting home environments that are supportive of children as students; (2) Communicating: Establishing effective school to home communications about student programs and child progress; (3) Volunteering: Parental help and support in classroom or school activities; (4) Learning at Home: Involving families with their children in learning activities at home, including homework and other curriculum-linked activities and decisions; (5) Decision Making: Inclusion of parents in school decision, developing parent leaders and representatives; (6)

Collaborating with Community: Integrating resources and services from the community to strengthen school programs.

Hoover, Dempsey and Sandler (1985, 1995, 2005) define parental involvement through mechanisms of influence: modeling of behaviors, reinforcing school values and home-based instruction. Involved parents encourage pro-school ideals through reinforcement of behaviors likely to increase learning (eg: study, regular attendance). Fan and Chen (2001) assert that the Hoover-Dempsey and Sandler model holds considerable appeal as a comprehensive model of family involvement; it attempts to both explain parents' rationale for involvement and describe mechanisms for involvement.

Desforges and Abouchaar (2003) describe the most efficacious forms of parent involvement are those which encourage parents to interface directly with their children on learning activities in the home. Cotton and Reed-Wikelund (1989) found that active forms of parent involvement, such as participating in phone calls with teachers, reading and signing homeschool communications and participating in parent teacher conferences, produce greater achievement benefits than the more passive ones. Considerably greater achievement benefits are noted when parent involvement is active and includes participation in school and classroom activities such as direct classroom participation or field trips.

Family Involvement in Virtual Schools

Scant literature regarding the role of parents in K-12 virtual schooling exists. A comprehensive literature search utilizing the ProQuest Database, EBSCOhost and Google Scholar with the following search terms: Virtual School, Online Learning, Parents, Family, Involvement, Achievement, and Student revealed relatively few mentions of parents in contemporary literature, limited to: Del Litke (1998); Clark (2001); Russell (2004); and Black, Ferdig and DiPietro (2008). No quantitative studies with a primary focus on parental

involvement were found. Further investigation of Del Litke's 1998 qualitative study of a Canadian Online Middle School offers several important insights:

- Teachers identified supportive parents as a significant factor in student success.
- Teachers discovered that attempts to facilitate online relationships with parents proved difficult.
- Reliance on parents for authoritative purposes provided inconsistent outcomes.

Del Litke characterized parent involvement based on the student's perception, dividing parents into three separate groups: absentee, supporters and participative parents. Through this process, Del Litke acknowledges the critical role that parental perceptions play in online student achievement in congruence with Hoover-Dempsey and Sandler's (2005) model of parental involvement. Russell (2004) supports Del Litke's commentary on virtual school parents, asserting that a virtual school instructor's lack of physical presence results in a portion of the responsibility for a student's education returned to the family in the virtual schooling model. Thus, it is important that parents provide appropriate support to enable the timely completion of schoolwork, and appropriate use of an online computer at home or elsewhere.

A significant amount of research and effort has focused on identifying traits of online learners that correlate value to success. Attributes such as self-motivation, technological experience, interest in subject matter and self confidence have all been recognized as contributory to a successful online learning experience (Gibson & Graff, 1992; Coussement, 1995; Richards & Ridley, 1997; Hardy & Boaz, 1997). In addition, a body of research concerning social constructs has assisted in providing greater understanding of social variables that contribute to a student satisfaction, learning and retention (Cereijo, Young & Wilhelm, 2001; Curry, 2000; Rovai & Whiting, 2005; Haythornthwaite, Kazmer, Robins & Shoemaker, 2000; Eastmond, 1995; Rovai, 2001a; Rovai, 2001b). The Cavanaugh et al. 2004 meta-analytic

assessment of factors contributory to success in K-12 virtual schooling led to the development of a systematic framework useful for outcomes based research. The four factors identified by Cavanaugh et al. were built on by Black, Ferdig and DiPietro (2008) drawing upon Del Litke (1998) to include additional categories, including a category that addresses the role of the parent and/or family in virtual student success, as shown in Table 2-1.

Because of the limited scope of research investigating the role of family involvement in virtual schooling a significant number of questions remain unanswered. Therefore, it is necessary to engage in a comprehensive study of parental involvement to determine its importance in K-12 virtual schooling. The Hoover-Dempsey and Sandler (1995; 2005) model of parental involvement provides a means by which the construct can be understood and interpreted, and its effect on a student population can be ascertained.

The Hoover-Dempsey and Sandler Model of Family Involvement

In spite of the overwhelming evidence supporting family involvement in students' education (Epstein, 1996; Fan & Chen, 2001; Henderson & Mapp, 2002), significant barriers exist, consciously or unconsciously hindering implementation. These barriers are enacted by teachers, administrators and even parents themselves (Hoover-Dempsey, Walker, Jones & Reed, 2002; Hoover-Dempsey, Walker & Sandler, 2005; Edwards, 2004). To increase familial involvement, researchers have proposed several contemporary models of parental involvement. These models focus on aspects of parental involvement associated with family school partnerships (Edwards, 2004); the quantification of an underlying continuum for the measure of parental involvement (Cervone & O'Leary, 1982); the hypothesis that parental involvement is a form of social capital (Grolnick, Benjet, Kuriwski & Apostoleris 1997); and the categorization of relationships between the home and the school (Epstein, 1995). Each of these models can be applied in a virtual school setting, though, the previously mentioned models do not focus on a

measurable underlying psychology of the involvement activity (Franke, 2005). Rather, their focus is on actions. Because cognition precedes action, models that focus on actions do not provide for an adequate understanding of the antecedents that promote action (Leahy & Harris, 2001). To gain a comprehensive understanding of the latent psychological construct of parental involvement construct and observable factors associated with this construct within the context of virtual schooling, the Hoover-Dempsey and Sandler model (1995, 2005) of parental involvement was selected for this study. The model's focus on the psychology of involvement rather than involvement activities and actions provide for an ideal opportunity to explore the psychological construct of parental involvement in a new domain, K-12 virtual schools (Fan & Chen, 2001).

Hoover-Dempsey and Sandler (1995) built on the work of Eccles and Harold (1994, 1996) to discern motivations for parental involvement. They suggested that parental involvement is predicated on “personal constructions of the parental role, personal senses of efficacy for helping children succeed in school and parental reaction to the opportunities and demand characteristics presented by both their children and their children's schools” (p. 311). Armed with the theoretical antecedents of involvement, Hoover-Dempsey and Sandler (1995) hypothesized that they could then discern the influence that involvement had on student achievement.

Hoover-Dempsey and Sandler (1995) downplay, though do not marginalize, the prominence ascribed by researchers (eg: Lareau, 1989; Heymann, & Earle, 2000; Aughinbaugh, Pierret & Rothstein, 2005) to factors such as parents' education, income, marital status, and other indicators of family status in efforts to understand parents' involvement decisions. It is their assertion that these factors did not effectively explain parents' decisions to become involved, their choice of involvement forms, or the effects of their involvement on student outcomes.

Research by Hoover-Dempsey and Sandler (1995, 1996) focuses on understanding the psychological variables associated with parental involvement rather than solely focusing on involvement activities. By doing so, Hoover-Dempsey and Sandler subvert potential barriers or conceptualizations that may exist. As such, they have proposed a multi-level model describing the parental involvement process (Figure 2-1). Further, the Hoover-Dempsey and Sandler model (1995, 2005) complies with Fan and Chen's (2001) recommendation for measurable multidimensionality.

The Hoover-Dempsey and Sandler (2005) model of parent involvement is a five tiered construct; the first tier suggests that parents become involved in their children's education for three major reasons:

- Personal motive (Do parents believe they should be involved?)
- Life context (Do parents have the knowledge/skills and time necessary to help their child?)
- Invitations (Do parents believe that the school wants their involvement?)

The second tier of the model describes the parent's mechanisms of involvement:

- Encouragement (What are the methods of academic encouragement?)
- Modeling of appropriate school-related skills (Are parents modeling academic skills? eg: reading, writing, mathematics)
- Reinforcement of learning and attributes related to learning (By what means do parents reinforce leaning behaviors?)
- Instruction (What instructional methods are used by parents to assist children?)

The third tier of the model focuses on the child's perception of parental involvement:

- Encouragement (What are student perceptions of their parent's methods of academic encouragement)
- Modeling of appropriate school-related skills (What are student perceptions of their parent's modeling of academic skills?)

- Reinforcement of learning and attributes related to learning (What are student perceptions of parental reinforcement behaviors related to academics?)
- Instruction (What are student perceptions of the instructional methods used by parents?)

The fourth tier of the model focuses on attributes associated with student learning:

- Academic self-efficacy
- Intrinsic motivation to learn
- Self-Regulatory Strategy Use
- Social Self-Efficacy

The fifth tier of the model represents an outcome variable influenced by parental involvement. According to Hoover-Dempsey and Sandler (1995), these outcome variables could include measures of achievement, measures of knowledge or a measure of school-based efficacy.

Investigations by Hoover-Dempsey and Sandler (2005) and Green and Hoover-Dempsey (2007) provide validation for this model within the context of elementary school-age students and their parents. This research indicates that parents' motivational beliefs, perceptions of invitation for involvement from others and perceived life context contribute to parental involvement behaviors. These involvement behaviors are mediated by the child's perception of parental involvement, which in turn effect attributes within the child, such as self-efficacy and achievement motivation, which have effect on achievement (Figure 2-2).

Regression results suggest that parent reports of involvement were significant in predicting student academic outcomes (Adj. $R^2 = .039$, $F = 17.890$, $p < .000$; $t = 4.230$, $p < .000$) and student reports of parental involvement were significant in predicting student outcomes (Adj. $R^2 = .357$, $F = 234.393$, $p < .000$; $t = 15.310$, $p < .000$). When combined, the direct path between parent reports and student outcomes became insignificant, while the path between student reports

and student outcomes remained significant ($\text{Adj. } R^2 = .361, F = 119.431, p < .000$). These results provide evidence to support the utilization of this instrument with the study population. The assessment was validated and refined on a diverse population of parents and students in four separate studies from 2002-2003 (Hoover-Dempsey & Sandler, 2005). Correlations related to individual attributes can be found in Table 2-2.

Figure 2-3 is a path diagram of the Hoover-Dempsey and Sandler model (2007). This path diagram shows the tiered contributory fashion by which parent motives and beliefs effect student achievement.

The Hoover-Dempsey and Sandler model presents just one of many conceptualizations of the family involvement construct utilized in educational research. The specific affordances of the model: multi-dimensionality, quantitative nature and focus on psychological factors rather than socioeconomic factors and involvement activities make it an ideal tool for application with a sample of virtual school students.

Conclusion

Recent research has provided evidence of the effectiveness of virtual high schools (Cavanaugh, Gillan, Kromrey, Hess, and Blomeyer, 2004), leading some educational leaders to propose that online learning is one of the most important new approaches for K-12 schools (Blomeyer, 2002). Unfortunately, there is still not enough research to inform new policy and practice in this area, particularly concerning the role of the parent in student achievement (Black, Ferdig & DiPietro, 2008).

In this chapter, a review of literature established the foundation for an understanding of K-12 virtual schooling in the U.S., current research related to achievement in K-12 virtual schooling, and an overview of family involvement and literature related to family involvement in K-12 virtual schools. Finally, a model of family involvement and its relationship to student

achievement was described. This literature review sets the stage for the argument that an understanding of the role of the family in virtual schooling may provide an understanding of a factor that is purported to affect student achievement.

Table 2-1. Success factors in K-12 virtual schooling

Abilities and disabilities of the student	Cavanaugh et al. (2004)'s success factor
Quality of the teacher	Cavanaugh et al. (2004)'s success factors
Demands of the content	Cavanaugh et al. (2004)'s success factors
Design of the distance learning system	Cavanaugh et al. (2004)'s success factors
Course Instance	Added by Black, Ferdig & DiPietro (2008)
Other (including: parents, guardians, mentors)	Added by Black, Ferdig & DiPietro (2008)

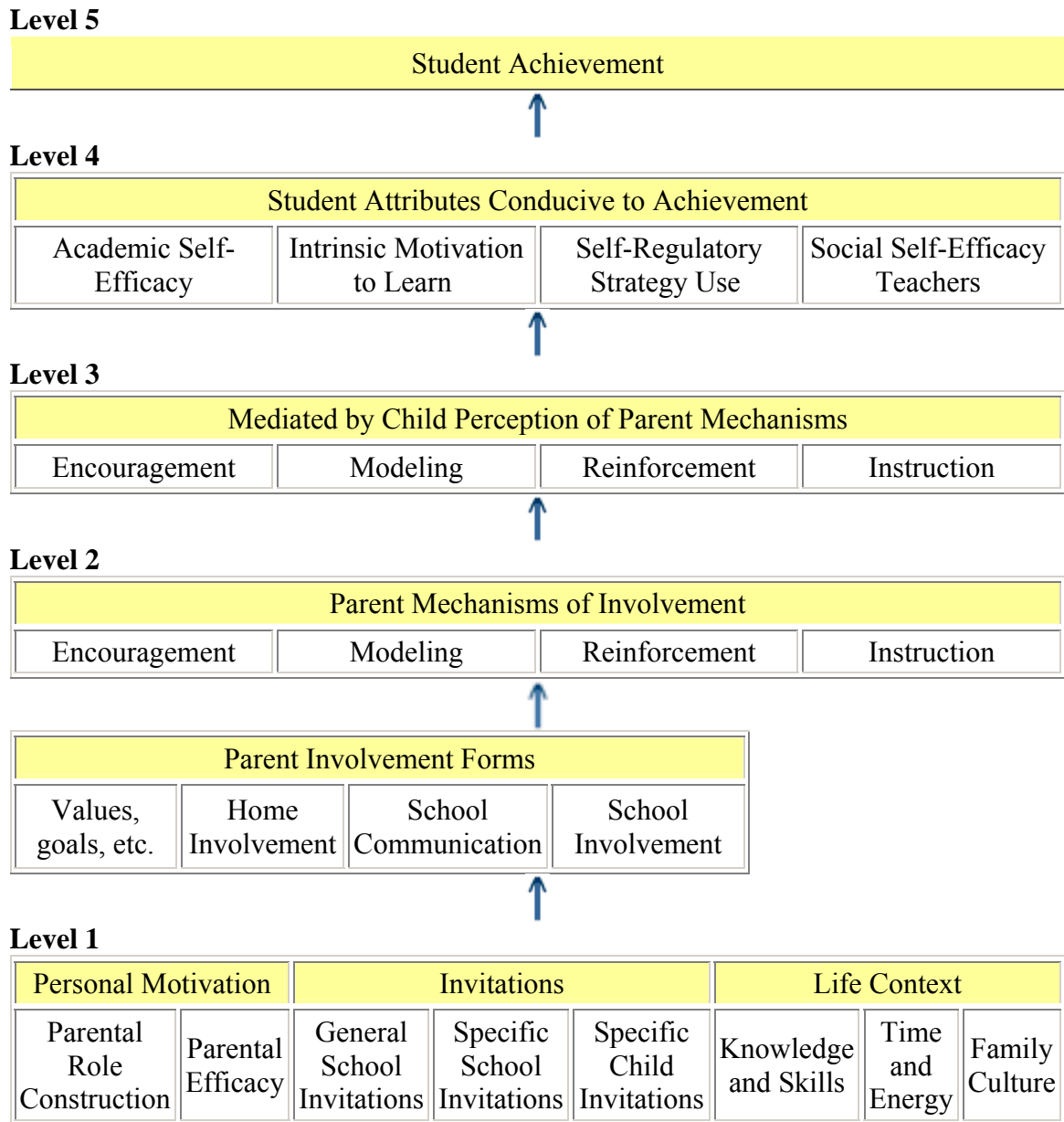


Figure 2-1. The Hoover-Dempsey and Sandler model of parental involvement, adapted from Hoover-Dempsey & Sandler, 1995; 2005

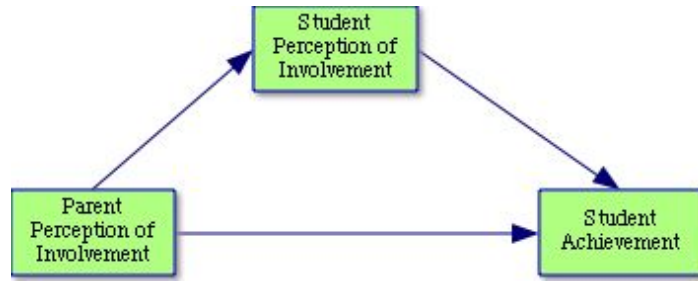


Figure 2-2. Diagram describing the results of Hoover-Dempsey and Sandler's 2005 study

Table 2-2. Correlations among parents' reports of involvement mechanisms, student perceptions of parent's involvement, and a summary measure of student achievement (Hoover-Dempsey & Sandler, 2005)

Parent report of involvement mechanisms	Parent report encouragement	Parent report modeling	Parent report reinforcement	Parent report instruction	Student report parental encouragement	Student report of parental modeling	Student report of parental reinforcement	Student report of parental instruction	Achievement TCAP
Encouragement	--								
Modeling	.67**	--							
Reinforcement	.70**	.75**	--						
Instruction	.61**	.72**	.70**	--					
Student report of parental involvement									
Encouragement	ns	.17**	.14**	ns	--				
Modeling	.11*	.22**	ns	.20*	.59**	--			
Reinforcement	.10*	.22**	.16**	.22**	.82**	.61**	--		
Instruction	ns	.16**	ns	.17**	.76**	.71**	.74**	--	
Student achievement	.18**	.15**	.25**	ns	ns	ns	ns	-.12*	--

* p = .05 ** p = .01

TCAP stands for Tennessee Comprehensive Achievement Test, student's TCAP scores were used as achievement variables by Hoover-Dempsey.

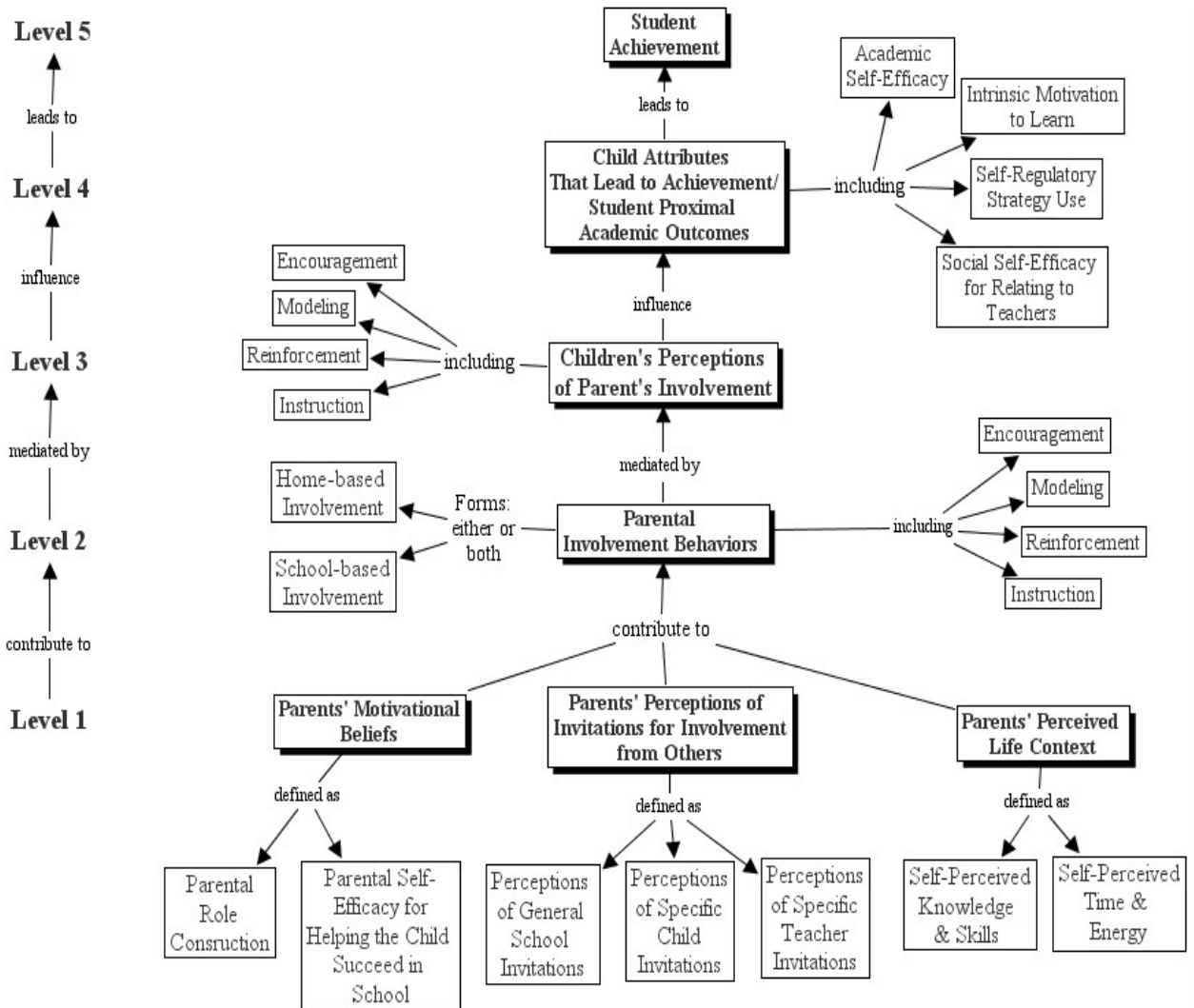


Figure 2-3. Path model for the Hoover-Dempsey and Sandler model of parental involvement (Hoover-Dempsey, 2007)

CHAPTER 3 METHODOLOGY

Introduction

The research study surveyed both virtual school students and their parents regarding perceptions of their involvement in the student's schoolwork. Utilizing existing partnerships established through work with the AT&T Foundation, it was determined that state virtual schools are actively voicing questions regarding the effect of parental involvement on virtual school student achievement. A partnership with a state-led virtual school in the Southeastern United States was established to facilitate the collection of data; respondents consisted of students and a parent enrolled within this institution during the summer 2007, fall 2007 and spring 2008 semesters.

Research Overview

This study employed an online survey adapted from research by Hoover-Dempsey and Sandler (2005). Data were collected from a population of virtual school students and their parents in a two-tiered fashion: Tier one targeted parents of virtual school students. Tier two targeted the child enrolled in the virtual school related to a responding parent. Responses were analyzed and achievement data, in the form of a semester grade for the course (or average grade for the courses) in which the child was enrolled during the summer 2007, fall 2007 and spring 2008 semesters, were collected and evaluated in relation to the surveys. Quantitative statistical procedures were utilized to analyze the data.

Research Design

Educational leaders and policy makers have articulated unease with the lack of scientifically based data upon which funding decisions for educational policy issues can be based (Schneider, Carnoy, Kilpatrick, Schmidt & Shavelson, 2007). Schneider et al. call for an

increased emphasis on methods to discern causality; one such suggested method is quantitative research. To answer the call for empirical data, a quantitative research design was used to assess the role of parental participation in the educational process in their children's virtual school academic achievement. This outcomes-focused, positivistic method was selected to provide for a scalable, replicable, objective, empirical investigation. Through the adoption of a positivistic point of view it is possible to test theory through analysis of data collected from research subjects, and to develop optimal estimations and an indication of the precision of one's outcome (Dooley, 2001; Duncan, 1975). Further, through the use of quantitative data collection it is possible to sample a large number of individuals and project these results to a population. Quantitative data generated by this study were analyzed using statistical procedures.

Population

The state-led virtual school utilized for this study has established data infrastructures that allow access to student and parent email, address and phone number information and student achievement data. Thus, responses could be collected using a multi-phased approach. Given the ease and speed by which Internet based surveys can be conducted, and the validity of the data collection medium when compared to traditional means, utilizing the Internet to obtain student and parent responses is optimal (Chang & Krosnick, 2002).

The virtual school surveyed in this study is a state-level institution, meaning its central administering agency is a state department of education and its primary means of funding is through state level funds. The school describes itself as a supplementary online educational program created to serve public, private and home school study student populations from across the state. Online courses are provided within the traditional agrarian school calendar. These courses consist of 78 core curriculum offerings, AP and elective courses. Virtual school students are primarily high school level students; though there is a limited set of courses available to

middle school level students. The virtual school offers both state funded and tuition funded seats to the state's students. Local school districts are responsible for establishing policy regarding the number of state funded course enrollments in which a student may participate at a given time.

Individuals were recruited from the grade 9-12 courses. Research indicates that the virtual school population consists of a racially diverse student body, that while not completely representative of the state's face-to-face school population, compares favorably with other state virtual schools in terms of the ratio of virtual school to statewide enrollment percentages for minority students (Clark & Blomeyer, 2007).

Course content was not be taken into account when recruiting students as the composition of the student population limits the ability to build a substantive sample population within a specific content area. Evidence for this is provided through analysis of the virtual school's enrollment data for spring 2007. These data indicate a mean enrollment of 15 students ($SD = 9.7$) in 181 courses in 8 course content areas. This diversity would hinder the composition of a sample of substantive size and statistical relevance. Additionally, research indicates that intrastate virtual school populations are relatively homogeneous (Zucker & Kozma, 2003), which may serve as a potential confound, though it represents an opportunity for future analysis. Group-wise deletion was utilized to assure that only students and their corresponding parents are included in the data analysis.

Privacy and Confidentiality

This research study falls under the scrutiny of both the University of Florida Institutional Review Board (IRB) and U.S. Federal Educational Rights and Privacy Act (FERPA). Behavioral and Non-Medical IRB, designated IRB02 within the University of Florida system, is responsible for reviewing and monitoring research with human subjects conducted at the University of Florida. The board reviews research studies that involve behavioral observations and recordings,

non-invasive physiological recordings, analysis of documents that were previously gathered for nonresearch purposes, evaluation of behavioral/social interventions or manipulations, educational assessments, interviews, surveys, cognitive tests, and taste/food evaluations of wholesome food within FDA regulations. The University of Florida IRB (2007) accepts as basic principles those expressed in the Nuremberg Code (1947), the Declaration of Helsinki (revised 1975), and the Belmont Report (1979). Before engaging study participants, a research proposal was prepared and presented and approved by the University of Florida IRB (Appendix A).

Additionally, because the research project concerns the collection of data from the records of minors, it was incumbent upon both the researcher and the virtual school to comply with the tenets of FERPA. FERPA's latest revision, 2001, reforms its purpose statement to read: "preventing an education agency or institution from sharing student records, or personally identifiable information in these records, without the written consent of a parent." (NCES, 2006). FERPA specifications, which outline the conditions for exceptions to the requirement of parental consent based on the organization or circumstance on which the request is based, are vague. To provide some clarification and proactively address the potential obstacles presented by FERPA, it is important to outline the impact of the act on the realm of educational research.

The requirements outlined by FERPA do not stipulate the terms of compliance; individual states are responsible for completing this task. Though many states have as yet to formally publish procedures for compliance, there is considerable apprehension regarding sharing information with entities outside a specific state educational organization.

FERPA allows for several exceptions to its privacy restrictions, enabling state and local agencies to provide external entities access to student information. The first exception is termed 'directory information', which includes student information that is not generally considered

harmful or an invasion of privacy such as: name, address, telephone number, date and place of birth, honors and awards, and dates of attendance. Under FERPA, school systems have flexibility in deciding what student data is directory information; the only requirement being that parents have the opportunity to request the exclusion of their child's data. In addition to directory information, FERPA allows disclosure, without consent, to the following parties or under the following conditions (except as noted, conditions are listed in 34 CFR § 99.31):

- School officials are permitted to access student information to perform their professional responsibility.
- Representatives of federal state or local education agencies are permitted to access student information as part of an audit, evaluation, or to enforce educational programs.
- Organizations are permitted to access student information for conducting a study on the schools behalf to develop, validate, or administer predictive tests, administer student aid programs, and improve instruction.

Upon agreeing to participate in an evaluation by external researchers or evaluators, an educational entity may provide access student information and data. The responsibility falls on the educational entity to comply in their reporting with the stipulation that students not be individually identified, or even recognizable through outcomes.

Data Integrity and Security

The advent and evolution of the World Wide Web and other electronic methods of mass communications has made data privacy and protection issues of prime importance for government entities, educational institutions, private industry and individuals. It is the priority of the researcher to ensure the privacy and protection of the data collected from the virtual school. Therefore, a structured policy has been adopted for data storage, transformation and reporting. The key principles instituted to ensure data protection and integrity are:

- Notice: The virtual school has been notified about the purposes for which the data was collected, the data will not be used for any other purpose. The virtual school can contact the University of Florida researcher at anytime with any inquiries about data.

- **Individual Privacy:** The researcher works to limit the collection of personally identifiable information related students or teachers including, their name, address and phone numbers.
- **Sharing:** It is the standard practice of the researcher to provide interstate data in aggregate to ensure that only non-identifiable data are presented through aggregate reports in the data portal.
- **Access:** The virtual school has full access to its data and the ability to correct or amend information where it is inaccurate.
- **Security:** The researcher has taken precautions to protect individual virtual school information from loss, misuse and unauthorized access, disclosure, alteration and destruction. The researcher strictly follows the industry's best practices to protect servers and data infrastructure from unauthorized access. All web applications are tested and scanned for security vulnerabilities before deployment. Database servers are updated and backed up regularly and connections are audited to detect security related issues. Standard techniques to secure system files, such as: encryption, utilization of firewall and antivirus solutions are used to make servers secure.
- **Data integrity:** The researcher strives to assure that all the data is relevant for the purposes for which it is to be used and is reliable for its intended use, accurate, complete, and current.

Power Calculation and Sample Size

The power of a statistical test is the probability that the test will reject a false null hypothesis (that it will not make a Type II error). As power increases, the chances of a Type II error decrease. The probability of a Type II error is referred to as the false negative rate (β). Therefore, power is equal to $1 - \beta$ (Cohen, 1988). Cohen (1992) describes power of .80 as an acceptable convention that effectively minimizes the risk of Type II error while not increasing the researcher's material costs for collection of data. Utilizing GPower, a power analysis tool, a one-tailed, post hoc calculation of power was made: $d = .385$ $\alpha = .05$, sample size = 168 pairs, estimates power of .80. According to Gatti and Harwell (1998) the utilization of software to calculate power provides estimations that are precise and easier to extrapolate than traditional power charts.

Sampling Procedure

To obtain a proportional sample of students from the institution, the entire body of students enrolled in the virtual school during summer 2007, fall 2007 and spring 2008 semesters was contacted. This procedure allowed for an equal possibility of selection by all members of a population for which AVS maintains data (Dillman, 2007).

Instrumentation

A survey instrument designed by Hoover-Dempsey and Sandler (1995) was adapted for this research study. The instrument was developed as a part of a comprehensive research program intended to a) develop and refine scales necessary to test the Hoover-Dempsey and Sandler (1995, 1997) model of parental involvement and b) examine elements of the parental involvement process described by the model. The survey successfully described the relationship between parent perceptions of school involvement, student perceptions of school involvement and student academic achievement with sufficient reliability and validity (Hoover-Dempsey & Sandler, 2005; Green, Walker, Hoover-Dempsey & Sandler, 2007). Results of Hoover-Dempsey and Sandler's 2005 study can be summarized in Figure 3-1.

Regression results suggest that both parent and student reports of involvement were significant in predicting student academic outcomes (Adj. $R^2 = .039$, $F = 17.890$, $p < .000$; $t = 4.230$, $p < .000$) and student reports of parental involvement were significant in predicting student outcomes (Adj. $R^2 = .357$, $F = 234.393$, $p < .000$; $t = 15.310$, $p < .000$). When combined, the direct path between parent reports and student outcomes became insignificant, while the path between student reports and student outcomes remained significant (Adj. $R^2 = .361$, $F = 119.431$, $p < .000$). These results provide evidence to support the utilization of this instrument with the study population. The assessment was validated and refined upon a diverse population of parents and students in four separate studies from 2002-2003 (Hoover-Dempsey & Sandler, 2005). Table

3-1 provides correlations between factors from Hoover-Dempsey and Sandler 2005 study. Both the parent and the student surveys are featured in Appendix D and E respectively.

Achievement Data

Under state law applicable to the virtual school studied (160-4-2-.13 Statewide Passing Score), the “lowest possible score that a student can earn and still meet the requirements for completion of a subject or grade” is 70 percent based on a 100 percent scale. For this study, achievement data will be collected in the form of the student’s numeric course grade, based on a scale from 0 to 100, for the summer 2007, fall 2007 and spring 2008 semesters. Jeynes (2005) notes in his 2005 meta-analysis that numeric course grade data has been found as a statistically significant dependent variable in family involvement studies. Jeynes encourages the use of course grades rather than standardized tests as a measure of achievement as parents are more likely to focus their involvement on classroom assignments rather than preparing their child for a standardized test.

The virtual school, in conjunction with its state department of education provided detailed course grade information on 453 of the students whose parents completed the survey. This number represents 48% of the sample. This grade data had a range of 90, with a minimum of 10 and a maximum of 100, a mean of 82.5 with a standard deviation of 16.3 and a variance of 265.5. The virtual school reports grades in a percentage format as schools and school districts may have different grading scales.

Revision and Proposed Path Model

Hoover-Dempsey and Sandler’s survey was revised through the exclusion of questions from the parent survey pertaining to face-to-face school involvement. Two factors influenced the reduction of the Hoover-Dempsey and Sandler Model: geography and existing research. Given that virtual schools do not have a physical location, there are specific limits to a parent’s ability

to self-involve specific to the virtual school. Further, an existing body of research has been developed that focuses on the proximal factors associated with student success including, Roblyer and Marshall (2002), Cavanaugh (2002), Dorman (2003), Swan (2003) and Ferdig, Papanastasiou and DiPietro (2005). There are few empirical studies in K-12 virtual schooling that incorporate achievement based outcomes as a dependent variable, thus a simplified model is elicited from the Hoover-Dempsey and Sandler model of parental involvement (Figure 3-2). This model recognizes that student factors exist but chooses to instead focus on the outcomes of these factors: student achievement data.

With the assistance of two focus groups consisting of a total of six high school students, slight wording changes were made to the student survey to make the survey more appropriate for the sample. The refined student survey was then subjected to a content review by three subject matter experts. Through this process, the survey was made more appropriate for use with an online learning population. The revised assessment consists of two forms, a 78 question parent form and a 50 question student form.

Data Collection and Analysis

Data was collected utilizing the Zoomerang (<http://www.zoomerang.com>) a secure, web-based survey interface. Students and parents were contacted via email with an email explaining the survey and inviting participation. This email briefly explained the study and offered students and parents the opportunity to remove themselves, through the use of an 'unsubscribe' link, from the sample and to contact the research team for more information about the study. Due to the group-wise deletion procedure employed by this study, if a parent voluntarily withdrew from the sample population, his/her student would not be sent survey materials.

Approximately three days after the initial survey invitation, a subsequent reminder was sent to non-respondents. Two additional reminders were sent to parents before closing the parent survey.

Data were organized and sorted utilizing Microsoft Excel and SPSS 13.0 to efficiently code and transform data for analysis. Data analysis was conducted using SPSS 13.0 and SAS 9.1. SAS 9.1 was employed to account for missing data through multiple imputation procedures. Multiple imputation is a statistical calculation of missing values based upon probability. The specific method utilized for analysis, Markov Chain Monte Carlo (MCMC), specifies that all data are missing completely at random (Rubin, 1976; Little & Rubin, 1987). In the parent survey, excluding demographic information, missing data accounted for as little as .003% of responses to a question and as many as 13% responses to a question. Missing data accounted for as little a 0% of responses to as many as 7% responses to a question in the student survey. This analysis procedure decreased the amount of data that would have been lost utilizing a procedure such as group-wise deletion.

Data analysis procedures allowed for the grouping and comparison of between and within group responses of student and parent data. In addition, regression techniques were applied utilizing both achievement data and student academic self report variables as dependent variables to both explain and predict potential implications for policy and practice.

Data Analysis Techniques Employed

Research question 1: What quantifiable impact, if any, does familial involvement have on student achievement in K-12 virtual schooling?

H_0 : Familial involvement does not effect virtual school achievement.

Regression procedures were employed utilizing achievement data as a dependant variable and student perception and parent perception as independent variables. Correlations and partial correlations were calculated to assist in the analysis of this question.

Research question 2: Do students and parents differ in their perceptions of familial involvement in K-12 virtual schooling?

H_0 : Parental perceptions of familiar involvement do not differ from student perceptions of familial involvement.

Responses between student and their parent were compared across grouping variables that included: student gender, parent gender, race and socioeconomic status.

Research question 3: Is there an interaction amongst factors, including, socioeconomic status, race and gender, when measuring the effect of parental involvement of families in virtual schooling?

H_0 : Race does not have a significant interaction effect with other factors when measuring family involvement in virtual schooling.

H_0 : Socioeconomic status does not have a significant interaction effect with other factors when measuring family involvement in virtual schooling.

H_0 : Student gender does not have a significant interaction effect with other factors when measuring family involvement in virtual schooling.

Two subjects multiple analysis of variance (MANOVA) procedures were employed, the first utilized student responses as dependant variables, fixed factors included student gender in addition to socioeconomic status, race, and parental education. The second procedure utilized

parental response data as dependant variables and gender, race, socioeconomic status and education as fixed factors.

Limitations

Limitations of this study include:

- The single state virtual school assessed, potentially preventing the generalizability of this study to other states.
- The survey was only provided in an English language format, thus non or limited English speaking individuals may have been underrepresented in the sample population.
- The possibility for socially desirable responses by respondents, particularly parents, exists as the nature of topical matter covered by the survey may have lead respondents to skew responses toward a higher degree of involvement.
- Given that the student survey instrument adapted for this study was designed and validated upon an elementary population, there existed the possibility of a significant threat to validity.
- The student survey was subjected to redesign and provided with a limited external review; therefore, there exists the possibility of measurement error due to poor wording or presentation of questions.

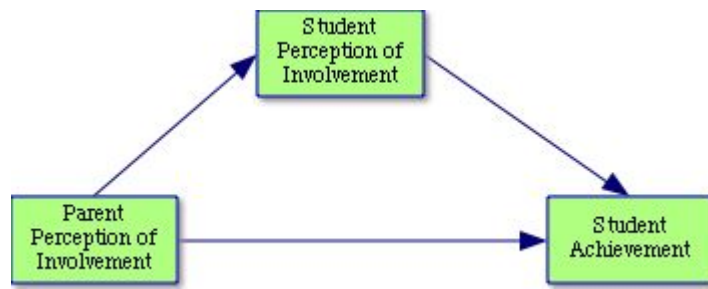


Figure 3-1. A detail of the interaction between factors from Hoover-Dempsey and Sandler's 2005 study

Table 3-1. Correlations among parents' reports of involvement mechanisms, student perceptions of parents' involvement, and a summary measure of student achievement (Hoover-Dempsey, 2005)

Parent report of involvement mechanisms	Parent report encouragement	Parent report modeling	Parent report reinforcement	Parent report instruction	Student report parental encouragement	Student report parental modeling	Student report parental reinforcement	Student report parental instruction	Achievement TCAP
Encouragement	--								
Modeling	.67**	--							
Reinforcement	.70**	.75**	--						
Instruction	.61**	.72**	.70**	--					
Student report of parental involvement									
Encouragement	ns	.17**	.14**	ns	--				
Modeling	.11*	.22**	ns	.20*	.59**	--			
Reinforcement	.10*	.22**	.16**	.22**	.82**	.61**	--		
Instruction	ns	.16**	ns	.17**	.76**	.71**	.74**	--	
Student achievement	.18**	.15**	.25**	ns	ns	ns	ns	ns	-.12*

* p = .05 ** p = .01

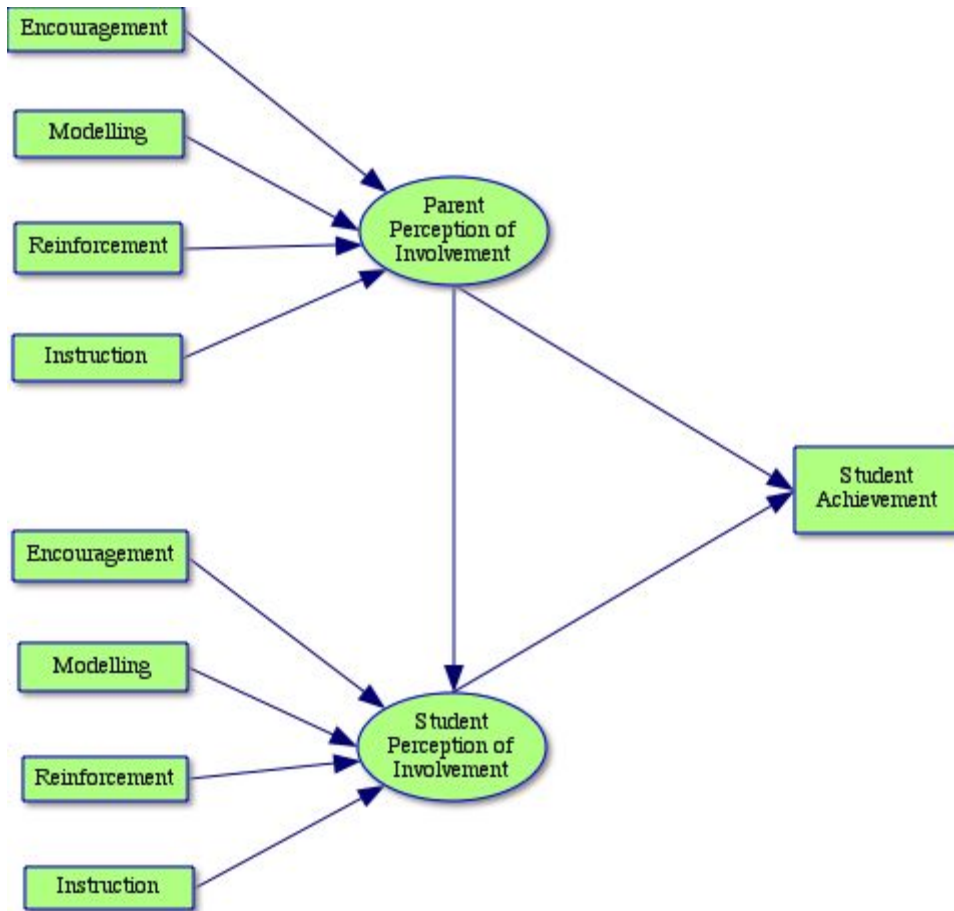


Figure 3-2. Proposed path model for Hoover-Dempsey & Sandler model of parental involvement

CHAPTER 4 RESULTS

Introduction

This chapter will report results obtained through the investigation of the role of familial participation in student's achievement in K-12 virtual schools. The chapter will: (a) describe the sample and report findings associated with the research questions described in Chapter 1; and (b) examine the impact of familial involvement on student achievement in K-12 virtual schooling, discerning differences in student and parental perception of familial involvement in K-12 virtual schooling, and describing demographic factors that effect parental involvement in virtual schooling.

Sample

Utilizing a list provided by the virtual school, 10,169 parents of students enrolled in 2007-2008 were contacted via email with a request to take part in the study. In order to expedite the contact and data collection, an online survey application, Zoomerang, was utilized. The respondent population can be divided into four distinct groups: Parent Groups A, B, C and Students. The first group, Parent Group A, consists of all the parent respondents (n = 940, a 9% survey response rate). These individuals represent the entire sample of parents whose child enrolled in the virtual school and responded to the parent survey. The second group, Parent Group B, (n = 776) consisted of parents who responded to the survey and whose child did not respond to the student survey. The third group, Parent Group C, (n = 164) represent parents respondents whose child also responded to the student survey. 665 individuals (71%) in Parent Group A elected to allow their student to participate in the survey, the students who responded comprised the fourth and final group, Student Group, (n = 164). This group consisted of students who were enrolled in the virtual school and responded to the survey. In this group, demographic

data pertaining to the student was obtained through his/her parent's responses. It should be noted that not all of the 665 students whose parents had allowed contact could be reached via email. The virtual school could not produce email addresses for 180 of the 665 students, limiting the total pool of potential student respondents to 485. Thus, the student response rate based on a possible 485 responses was 36%.

Parent Group A: All Parent Respondents

The parent group A sample consisted of 940 individuals. The respondents were asked to provide demographic information including information related to gender, employment, income, average time spent at work and education. This information is summarized in table 4-11. Parent Group A can be described as primarily white, female, upper-middle class, well educated individuals, who are employed in full-time professional occupations. The majority of respondents were female (72%). Of those providing employment information the largest segment (27%) of the sample described the nature of their employment as professional or executive, followed by teacher (18%) and unemployed, retired, student or disabled (11%). Only 6% of the sample reported annual household incomes of less than \$30,000, while 51% of respondents disclosed household income greater than \$60,000 annually.

A majority of respondents reported working more than 20 hours during the average week, with 41% of respondents indicating that they worked more than 41 hours during the average week. With the exception of 3 respondents, the sample consisted of high school graduates. 46% of respondents had obtained a bachelors degree, and 27% of respondents had post-baccalaureate educational experience at the graduate level. Achievement scores were available for 452 children of responding parents; this number represents 48% of the sample population. The average achievement of students corresponding to parents in the population was 82.5 (SD = 16.40, n = 452).

Parent Group B: Parents Whose Child Did Not Respond

The parent group B sample consisted of 776 individuals. Information related to this group can be found in table 4-2. This parent group consists of predominately white, female, professionals employed in full-time occupations. The majority of respondents within this group are considered upper-middle class and well educated.

Of those providing employment information the largest segment (28%) of the sample described the nature of their employment as professional or executive, followed by teacher (18%) and unemployed, retired, student or disabled (10%). A majority of the respondents were female (71%). 6% of the sample reported annual household incomes of less than \$30,000, while 51% of respondents disclosed household income greater than \$60,000 annually. The sample consisted of a racially diverse, though predominantly white population (58%). A majority of respondents reported working more than 20 hours during the average week; 40% of respondents indicated that they worked more than 41 hours during the average week. With the exception of 2 respondents, parents who responded to the survey were high school graduates. 47% of respondents had obtained a bachelors degree, 28% of respondents had post-baccalaureate educational experience at the graduate level. Achievement scores were available for 350 children of responding parents; this number represents 45% of the sample population. The average achievement of students corresponding to parents in the population was 81.65 (SD = 17.16). This achievement data was not significantly different ($p = .12$) from the achievement data associated with the two parent groups (Parent Group A and Parent Group B).

Parent Group C: Parents Whose Child Did Respond

Parent Group C consisted of 164 individuals. Detailed information related to this parent group can be found in table 4.3. The 164 individuals comprising parent group C were primarily white females, employed full-time in professional occupations, the majority of these individuals

had household incomes placing them in the upper middle class and possessed more than a high school education.

72% of the individuals within this group were female and 64% were white. Members of Parent Group C (Table 4-3) were employed in a wide range of categories, including professional or executive (23%), teaching (18%) and social and public services (12%). Only 5% of this group came from households with annual incomes less than \$30,000, 55% of this group came from households with reported annual incomes of \$60,000 or greater. Parent Group C is slightly less educated than the overall respondent population, 43% of these parents reported having a bachelor's degree or greater. Achievement data was available on 102 students related to parents in this group (62%). The average achievement of students corresponding to parent group C was 85.6 (SD = 12.8). While this number is slightly higher than the average achievement for students associated with parent group A (82.5) and parent group B (81.65), there is no statistically significant difference in average achievement ($p = .12$) between the three groups.

Student Group

The Student Group consisted of 164 individuals. Detailed information related to these individuals can be found in Table 4-4. Students participating in this study were predominately white females who come from upper-middle class homes and whose parents have both completed high school and have some formal collegiate experience. Student's parents are employed, most in full-time jobs. The preponderance of students report that their mothers provide the majority of support for their school work.

Student respondents to the survey were predominantly female (63%) and primarily white (63%). Student respondents' parents were employed in a wide range of categories, including professional or executive (23%), teaching (18%) and social and public services (12%). Only 5% of student respondents came from household with annual incomes less than \$30,000, 55% of student respondents came from households with reported annual incomes of \$60,000 or greater. Student respondents came from households that were slightly less educated than the overall respondent population, 43% of student respondents parents reported having a bachelor's degree or greater. 60% of student respondents disclosed that their mothers provided a majority of support for their school work. 13% of respondents received a majority of support from their fathers. Achievement scores were available for 102 students; this number represents 62% of the sample population. The average achievement of student respondents was 85.6 (SD = 12.8).

A Summary of Survey Factors and Survey Reliability

The purpose of this study was to investigate the role of familial participation in student's achievement in a virtual high school. Three specific research questions guided the collection and analysis of data, question one explored the impact of familial involvement on student achievement in K-12 virtual schooling; question two sought to discern differences in student and parental perception of familial involvement in K-12 virtual schooling; question three sought to describe demographic factors that effect parental involvement in virtual schooling.

Detailed information regarding the survey, factors and methods utilized for data collection can be found in Chapter 3. As a brief summary, the study employed an online survey adapted from research by Hoover-Dempsey and Sandler (2005). Data were collected from a population of virtual school students and their parents in a two-tiered fashion: Tier one targeted parents of virtual school students. Tier two targeted the child enrolled in the virtual school related to a responding parent. Responses were analyzed and achievement data, in the form of a semester grade for the course (or average grade for the courses) in which the child was enrolled during the summer 2007, fall 2007 and spring 2008 semesters, were collected and evaluated in relation to the surveys. Quantitative statistical procedures were utilized to analyze the data.

The parent survey included four separate measurement variables:

- Parent Report of Modeling (Modeling): The 10 items comprising this factor sought to measure the number of reciprocal interactions between parent and child related to school activities (Hoover-Dempsey and Sandler, 2005).
- Parent Report of Instruction (Instruction): The 15 questions associated with this factor draw gauge both indirect and direct instructional activities undertaken by both child and parent associated with learning and academics (Hoover-Dempsey and Sandler, 2005).
- Parent Report of Encouragement (Encouragement): The 13 questions encompassing this factor elicited information related to parents' explicit affective support for the student's interest in school and learning (Hoover-Dempsey and Sandler, 2005).

- Parent Report of Reinforcement (Reinforcement): The 13 items comprising this factor measure parents' reinforcing behaviors used to shape student characteristics associated with positive learning outcomes (Hoover-Dempsey and Sandler, 2005).

The student survey also included four separate measurement variables:

- Student Perception of Parental Modeling of appropriate school-related skills (Student Modeling): These 10 items measured the students perception of reciprocal interactions between parent and child related to school activities (Hoover-Dempsey and Sandler, 2005).
- Student Perception of Parental Instruction (Student Instruction): This factor was comprised of 15 items which measured the students perception of both indirect and direct instructional activities undertaken by both child and parent associated with learning and academics (Hoover-Dempsey and Sandler, 2005).
- Student Perception of Parental Encouragement (Student Encouragement): The 12 questions encompassing this factor elicited information related to the students perception of parents' explicit affective support for the student's interest in school and learning (Hoover-Dempsey and Sandler, 2005).
- Student Perception of Parental Reinforcement of learning and attributes related to learning (Student Reinforcement): The 13 questions constituting this factor measure student's perceptions of parents' reinforcing behaviors used to shape student characteristics associated with positive learning outcomes (Hoover-Dempsey and Sandler, 2005).

Cronbach reliability coefficients were calculated for each of the four parent and student measurement variables. Alpha reliabilities (Table 4-5) for each of the factors is greater than .7, indicating a satisfactory level of internal consistency across all variables (Nunnally & Bernstein, 1994).

Research Question 1

What quantifiable impact does familial involvement have on student achievement in K-12 virtual schooling? : In the U.S., several virtual schools collect data from parents (W. Scott, personal communication, April 2, 2007), utilizing the information to ascertain an understanding of parental attitudes toward virtual schooling and curriculum. Unfortunately, there are no published studies that empirically investigate this impact (Russell, 2004; Black, Ferdig & DiPietro, 2008). A better understanding of factors related to online student achievement is of critical importance to K-12 online education (NCREL, 2002), as parental involvement is seen as a key component of other non-traditional forms of education, including charter schools and home schooling (Green & Hoover-Dempsey, 2007; Bulkley & Fisler, 2003). In order to effectively answer question one, three separate regression analyses were performed (regression analyses 1-3).

Regression analysis one was conducted utilizing student achievement (in the form of student virtual school grade(s)) as a dependant variable and the four involvement factors reported by parents: Encouragement, Modeling, Reinforcement and Instruction as independent variables. The analysis detailed in Table 4-6, was conducted on student achievement data from 452 students and their corresponding parent data. It reveals a non-significant relationship ($p = .46$) between the variables and student achievement, indicating that the four variables did not predict student achievement within this sample (Adjusted $R^2 = -.001$, $F(5, 447) = .89$, $p = .46$).

The second regression analysis (regression two) was conducted utilizing student involvement factors measured by the survey. In this analysis, student achievement (in the form of student virtual school grade(s)) served as a dependant variable and there were four independent variables: Student Encouragement, Student Modeling, Student Reinforcement and Student

Instruction. The analysis detailed in table 4-7, was conducted upon 101 students. This reduced sample size was related to grade data which could not be obtained from the virtual school. Student response data reveals a non-significant relationship ($p = .21$), indicating that within this sample the four variables did not predict student achievement (Adjusted $R^2 = .02$, $F(5, 96) = 1.47$, $p = .21$).

A third and final regression analysis (regression three) was conducted utilizing both parent and student involvement factors elicited by the survey (Table 4-8). In this analysis student achievement (in the form of student virtual school grade(s)) served as the dependant variable and there were eight independent variables: Encouragement, Modeling, Reinforcement, Instruction, Student Encouragement, Student Modeling, Student Reinforcement and Student Instruction. The analysis conducted on 101 students and their corresponding parent data reveals a significant relationship ($p = .03$) between the variables and student achievement, within this sample, the regressed variables explained 9.4% of the variance in student achievement (Adj $R^2 = .09$, $F(9,83) = 2.31$, $p = .02$). Specifically, two of the eight independent variables held significant value in the prediction of student achievement. Both of these variables were parent variables: reinforcement ($B = .58$) and instruction ($B = -.61$). The analysis indicates that a one point increase in parent reinforcement as scored by the survey will translate to a .583 point increase in student achievement. This result indicates that there is a positive relationship between a parent's perception that they praise their child for scholastic activities and a child's academic achievement in a virtual school course. Conversely, for each one point increase in parent instruction as score by the survey will translate to a .61 decrease in student achievement. This result indicates that there is a negative relationship between a parent's perception that they engage in instructional activities, such as teaching their child to engage in challenging problem

solving activities and to persist when a specific task is challenging, and a child's academic achievement in a virtual school course.

The results of regression one and regression three provide context for the assertion that there is a conflicting result associated with research question one. The results of regression one, conducted upon the 452 members of Parent Group A for which achievement data existed for their corresponding student, provide evidence that there is no relationship between parental involvement and student achievement. Results of regression three, conducted upon a subpopulation of the sample ($n = 164$) utilized in regression one (Parent Group C), directly contradicts this outcome, indicating that within this sample, there is indeed a relationship between parental involvement and student achievement. These results are detailed in Figure 4-1. Due to this discrepancy, a more granular investigation of the analysis was conducted. This investigation focused on differences in the independent variables associated with the samples. As the data were drawn from the same population, because of the difference in prediction, it was plausible to assume that a difference exists between the parents in the two samples (parents of students who did not respond to the survey (Parent Group B) and parents of students who did respond to the survey (Parent Group C)). The students could be eliminated from scrutiny as a differentiating factor, as student results were found to be non-significant.

Several issues could contribute to the outcome discrepancy described above, including parent and student demographics, differences in course content, instructors and schools attended by corresponding students in each group. Given the limitations of data collection, data were collected upon some, but not all of these potential variables. Therefore, survey factors and available demographics were analyzed to identify differences between members of Parent Groups B and C. These factors and demographics included: average reinforcement and

instruction scores for the two parent groups, race and ethnic data describing the members of the groups, and gender composition and income stratification information for the groups.

Average scores for reinforcement and instruction for parents in these groups are featured in table 4-9. An analysis of variance upon these factors reveals non-significant differences between the two groups of respondents for both the reinforcement and instruction factors, $F(1,940) = .49$, $p = .48$ and $F(1,940) = .17$, $p = .68$ respectively.

Analysis of income data between the groups reveals no statistically significant difference between the income distributes of parents of non-responding students and parents of responding students ($p = 1.00$ for the low, middle and high income classifications). Analysis of differences in the gender composition of the groups also reveals no statistically significant differences, nor were statistical differences found in the educational levels between parents of non-responding and responding students.

An analysis of demographic characteristics reveals significant differences in the racial make up of the groups. Group means are detailed in table 4-10, statistical results of a between groups analysis are featured in table 4-11; results indicate the following statistical differences: $p = .01$ for Asian/Asian Americans, $p < .01$ for Black/African Americans, $p = .05$ for Hispanic/Hispanic Americans, $p < .01$ for White/Caucasian Americans and $p < .01$ for individuals describing themselves as Other.

Thus, available information indicates that there are statistically significant differences in racial and ethnic composition between the members of parent groups B and C. Specifically; there are more individuals in Parent Group B who identify themselves as Asian/Asian-American and Black/African-American. In Parent Group C there are more individuals who describe themselves

as Hispanic/Hispanic-American, White/Caucasian and Other. Each of these differences is statistically significant.

The results related to research question 1 reveal conflicting information regarding the impact of parental involvement on student achievement in the research sample. Two different outcomes can be concluded based upon the analyses, these outcomes point to parental involvement having both a significant and a non-significant relationship to student achievement, depending upon the sample analyzed. A summary of the results is presented in table 4-12.

Research Question 2

Do students and parents differ in their perceptions of familial involvement in K-12 virtual schooling? : The theoretical models built upon during this study were developed and utilized with elementary and middle school populations, thus, it is important to assess the ability of the survey instrument utilized to effectively measure student and parent perceptions. Further, by understanding the base-line nature of both parent and student perceptions of involvement it is then possible to plan for further research and begin to construct and test interventions that work to mediate perceptions between parents and students.

In order to effectively address research question two, a within-subjects analysis of variance was conducted, utilizing two groups, student group and parent group C, with the four measurement variables nested in each group. The analysis indicates that the data do not violate the sphericity assumption ($E = 1.00$). Sphericity is a fundamental property necessary for within-subject ANOVA procedures, sphericity assumes that there is a homogeneity of variance between the levels of the factors utilized in this statistical analysis (Max & Onghena, 1999). The results of the within-subjects ANOVA reveal a statistically significant indication, $F(1,163) = 1510.37$, $p < .00$, $R^2 = .90$, $E^2 = .90$, that students and parents do indeed have differing perceptions regarding

the amount familial involvement present in their K-12 school work. Examination of group means across the four factors (Table 4-13 and Figure 4-2) reveals that students tend to rate a parent's involvement lower than parents rate their own involvement. This conclusion is supported (Table 4-14) by a statistically significant linear trend to the factor data: $F(1,163) = 1242.22$, $p < .00$, $R^2 = .88$, $E^2 = .88$. Finally, correlation data provides evidence of a statistically significant relationship between three of the four variables (Table 4-15).

The analysis associated with research question 2 revealed that parents and K-12 virtual school students have statistical differences in their perceptions of the amount of involvement parents have in their academic work. Outcomes indicate that parents data is compared to student data, the parents perceive themselves to be more involved in their children's academic.

Research Question 3

Do factors including, socioeconomic status, race and gender, effect involvement of families in virtual schooling? : Hoover-Dempsey and Sandler's (1995) research, which this study draws heavily upon, minimizes factors such as parents' demographics (eg: education, income, marital status, and other indicators of family status) in efforts to understand parents' involvement decisions. Nevertheless, the role of social and economic variables remains a source of considerable controversy in research concerning parental involvement in traditional schools (Lareau, 2000; 1989). Therefore demographics factors' influence on familial involvement in virtual schooling was an important aspect of this study. An analysis of demographic factors reveals several interactions between demographic variables; an interaction exists when the association between two variables changes as the value of a third variable increases or decreases (Agresti & Finley, 1999). Prior to an investigation of the effect of individual factors, the interaction between factors must be explored.

In the investigation associated with research question three, two separate between subjects analyses were conducted. The first analysis focused on student respondents and the demographic variables associated with these individuals (gender, race/ethnicity, education and household income). Results of the analysis (Tables 4-16 and 4-17) of students reveal a statistically significant interaction between gender and education across all four variables (student modeling, student instruction, student encouragement and student reinforcement). Results of the analysis of parent data reveal a statistically significant interaction between gender and race/ethnicity for all four variables (modeling, instruction, encouragement and reinforcement). When the data for these interactions were subjected to closer scrutiny it was apparent that outliers were influencing the results of both ANOVAs. An outlier is an observation that lies outside the overall pattern of a distribution (Moore & McCabe, 1999). There is no strict mathematical definition of what constitutes an outlier; the process of determining whether or not data should be considered an outlier is a subjective exercise (Hill & Lewicki, 2007). The first outlier, was an Asian/Asian-American male parental respondent (n=1) whose responses to the parent survey score far below the rest of the sample in each of the four parent factors (modeling, instruction, encouragement, and reinforcement). The second outlier, a student (n=1) whose parent is female with a doctoral degree, generated student survey scores far below the rest of the sample in each of the four student factors (student modeling, student instruction, student encouragement, and student reinforcement). A detailed analysis of the data with the outliers included can be found in Appendix B.

The student and parent outliers were eliminated from both analyses in order to remove their influence upon the sample. The data was reanalyzed utilizing between subjects ANOVAs, the first analysis focused on the parental variables. This ANOVA provided no evidence of a

statistically significant relationship between the study factors (modeling, instruction, encouragement and reinforcement) and the demographic data (gender, race/ethnicity, education and household income). This result indicates that there is no evidence, within the sample, of differences in parent gender, race/ethnicity, parent education or household income having an effect on a parent's perception of involvement.

The second ANOVA focused on the student respondents and the demographic variables associated with these individuals (gender, race/ethnicity, education and household income). Results (table 4.19) indicate a gender by income interaction, detailed in table 4.18, for the four dependent variables (student encouragement, student modeling, student instruction and student reinforcement). In addition, results indicate a significant main effect between student instruction and income, which is described in table 4-18.

These interactions reveal two distinct patterns, (a) male student respondents in the upper (>\$60,000 annually) and lower income (< \$30,000 annually) categories perceived a higher degree of encouragement, modeling, instruction and reinforcement from parents than male student respondents in the middle income category (>\$30,000 < \$60,000 annually) and (b) female student respondents in the middle income category perceived higher levels of encouragement, modeling, instruction and reinforcement from parents than female student respondents in the lower and upper income categories. Charts 4.4 – 4.8 describe the interaction effect between gender and income across all four variables.

Interaction 1

The first interaction, interaction 1, details the relationship between student modeling and household income, which is influenced by student gender (Figure 4-3). ANOVA results indicate a statistically significant interaction between average student encouragement and household income and gender, $F(2, 164) = 3.87, P = .05$.

Interaction 2

The second interaction, interaction 2, details the relationship between student instruction and household income, which is influenced by student gender (Figure 4-4). ANOVA results indicate a statistically significant interaction between average student instruction and household income and gender, $F(2, 164) = 5.36, P = .02$.

Interaction 3

The third interaction, interaction 3, details the relationship between student encouragement and household income is influenced by student gender (Figure 4-5). ANOVA results indicate a statistically significant interaction between average student encouragement and household income and gender, $F(2, 164) = 5.51, P = .02$.

Interaction 4

The fourth and final interaction, interaction 4, details the relationship between student reinforcement and household income, which is influenced by student gender (Figure 4-6). ANOVA results indicate a statistically significant interaction between average student encouragement and household income and gender, $F(2, 164) = 6.61, P = .01$.

Main Effect

The main effect, describes the effect of an independent variable, income in this instance, upon a dependant variable, student interaction. The ANOVA results indicate that there is a difference in student instruction based upon household income level. This effect, detailed in table 4-19 and figure 4-7 provides evidences that within the sample, students in lower and upper income levels perceived parents offering a similar level of instructional activities, while students from middle income households reported lower levels of parental instruction. Parental instruction was measured by obtaining information related to a student's perception of parental guidance related to activities such as homework and studying strategies.

The results of question 3 reveal several distinct phenomena, (a) male student respondents in the upper (>\$60,000 annually) and lower income (< \$30,000 annually) categories perceived a higher degree of encouragement, modeling, instruction and reinforcement from parents than male student respondents in the middle income category (>\$30,000 < \$60,000 annually) and (b) female student respondents in the middle income category perceived higher levels of encouragement, modeling, instruction and reinforcement from parents than female student respondents in the lower and upper income categories. Finally, (c) a significant effect was found related to household income, this income effect closely mirrors the interaction effects described previously, but it is a main effect, only concerning a single variable (household income). The main effect indicates that students in lower (< \$30,000 annually) and upper (>\$60,000 annually) income categories perceive greater levels of instruction from their parents than individuals in middle income categories (>\$30,000 < \$60,000 annually).

Summary of Findings

The three research questions sought to (a) explore the impact of familial involvement on student achievement in K-12 virtual schooling; (b) discern differences in student and parental perception of familial involvement in K-12 virtual schooling and; (c) describe demographic factors that effect parental involvement in virtual schooling.

The results of question one, the goal of which was to explore the impact of familial involvement on student achievement, provided a conflicting picture. Within the larger sample of parents and both responding and non-responding students, no significant statistical relationship ($p = .46$) was found to exist between the familial involvement factors and student achievement in K-12 virtual education. Within a smaller sample, consisting of parents and students who did respond to the student survey, two factors were found to be predictive of student achievement, parent reinforcement and parent instruction ($p = .026$). Based upon the outcomes of the analyses,

demographic differences between the parents in both samples were explored. This exploration provided evidence that there were significant differences ($p < .01 - p = .05$) in the racial/ethnic composition of the parent groups in the samples.

Results of research question two, which investigated differences in parent and student perception of familial involvement reveals that parents and K-12 virtual school students do indeed have statistically significant differences ($p < .00$) in their perceptions of the amount of involvement parents have in their academic work. Within the sample, on average, students described a much lower level of involvement than their corresponding parent.

The third and final research question's goal was to illustrate demographic factors' effect on parental involvement in virtual schooling. This analysis provided evidence that household income plays a direct role ($p = .05$) in the amount of parental instruction student perceive they are receiving. The pattern of this direct effect mirrors significant interaction effects occurring with student perceptions of parental involvement. These interaction effects reveal disparities in the way male and female students perceive the amount of encouragement, modeling, instruction and reinforcement they are receiving from their parents based upon household income. The pattern that emerges within the research indicates that male students perceive higher levels of involvement in lower and upper income categories, than male individuals in middle income categories. Conversely, female students respondents in the middle income category perceived higher levels of encouragement, modeling, instruction and reinforcement from parents than female student respondents in the lower and upper income categories.

The outcomes presented within this chapter provide evidence that family involvement and family demographics are indeed elements to that need to be considered when discussing factors that promote student success in K-12 virtual schools. In addition, the results of this study reveal

that the Hoover-Dempsey and Sadler (2005) assessment, adapted and utilized for this study, elicited internally reliable results. These results were applied to three research questions that seek to provide a basis for investigating the role of familial participation in students' achievement in K-12 virtual schools.

Table 4-1. Parent group A demographics

Gender	Male	135	14%
	Female	674	72%
	Missing	131	14%
Ethnicity	Asian/Asian-American	21	2%
	Black/African-American	172	18%
	Hispanic/Hispanic-American	20	2%
	White/Caucasian	561	60%
	Other	21	2%
	Missing	145	15%
Employment	Unemployed, retired, student, disabled	103	11%
	Labor, custodial, maintenance	7	0%
	Factory worker, construction	9	1%
	Driver (taxi, delivery, bus, truck)	8	1%
	Food service, restaurant	4	0%
	Skilled craftsman (plumber, etc)	13	1%
	Retail sales, customer service	32	3%
	Service technician (cars, appliances, etc)	4	0%
	Accounting, bookkeeping	64	7%
	Creative arts (writer, musician)	13	1%
	Sales (real estate, commodity goods, etc)	27	3%
	Social services, public services	78	8%
	Teacher	171	18%
	Professional, executive	253	27%
	Missing	154	16%
Household Income	Lower (< \$30,000)	53	6%
	Middle (\$30,000-\$60,000)	167	18%
	Upper (> \$60,000)	469	51%
	Missing	225	25%
Average Hours Worked During the Week	0-5	92	10%
	6-20	72	8%
	21-40	252	27%
	41-50	292	31%
	50 or more	94	10%
	Missing	138	15%
Parent's Educational Attainment	Less than high school	3	0%
	High school or GED	82	9%
	Some college, 2-year college/vocational	292	31%
	Bachelor's degree	179	19%
	Some graduate work	54	6%
	Master's degree	163	17%
	Doctoral degree	40	4%
Missing	127	14%	

Table 4-2. Parent group B demographics

Gender	Male	112	14%
	Female	553	71%
	Missing	111	14%
Ethnicity	Asian/Asian-American	18	2%
	Black/African-American	143	18%
	Hispanic/Hispanic-American	16	2%
	White/Caucasian	447	58%
	Other	15	2%
	Missing	126	18%
Employment	Accounting, bookkeeping	48	6%
	Creative arts (writer, musician)	10	1%
	Driver (taxi, delivery, bus, truck)	5	1%
	Factory worker, construction	6	1%
	Food service, restaurant	4	1%
	Labor, custodial, maintenance	6	1%
	Missing	144	19%
	Professional, executive	213	28%
	Retail sales, customer service	24	3%
	Sales (real estate, commodity goods, etc)	23	3%
	Service technician (cars, appliances, etc)	4	1%
	Skilled craftsman (plumber, etc)	11	1%
	Social services, public services	59	8%
	Teacher	138	18%
Unemployed, retired, student, disabled	81	10%	
Household Income	Lower (< \$30,000)	48	6%
	Middle (\$30,000-\$60,000)	137	18%
	Upper (> \$60,000)	385	51%
	Missing	206	24%
Average Hours Worked During the Week	0-5	68	9%
	6-20	55	7%
	21-40	203	26%
	41-50	243	31%
	50 or more	73	9%
	Missing	133	17%
Parent's Educational Attainment	Less than high school	2	0%
	High school or GED	62	8%
	Some college, 2-year college/vocational	231	30%
	Bachelor's degree	144	19%
	Some graduate work	43	6%
	Master's degree	133	17%
	Doctoral degree	37	5%
Missing	123	16%	

Table 4-3. Parent group C demographics

Gender	Male	24	15%
	Female	118	72%
	Missing	22	13%
Ethnicity	Asian/Asian-American	2	1%
	Black/African-American	27	16%
	Hispanic/Hispanic-American	5	3%
	White/Caucasian	103	63%
	Other	5	3%
	Missing	22	13%
Parental Employment	Accounting, bookkeeping	15	11%
	Creative arts (writer, musician)	3	2%
	Driver (taxi, delivery, bus, truck)	3	2%
	Factory worker, construction	3	2%
	Food service, restaurant	0	0%
	Labor, custodial, maintenance	1	1%
	Missing	24	15%
	Professional, executive	37	23%
	Retail sales, customer service	8	6%
	Sales (real estate, commodity goods, etc)	3	2%
Household Income	Service technician (cars, appliances, etc)	0	0%
	Skilled craftsman (plumber, etc)	2	1%
	Social services, public services	17	12%
	Teacher	29	18%
	Unemployed, retired, student, disabled	19	10%
	Lower (< \$30,000)	8	5%
	Middle (\$30,000-\$60,000)	32	20%
	Upper (> \$60,000)	92	55%
Missing	32	20%	
Average Hours Worked During the Week by Parent	0-5	22	13%
	6-20	14	9%
	21-40	43	26%
	41-50	47	29%
	50 or more	19	12%
	Missing	19	12%
Education	High school or GED	18	11%
	Some college, 2-year college/vocational	56	34%
	Bachelor's degree	34	21%
	Some graduate work	10	6%
	Master's degree	23	14%
	Doctoral degree	3	2%
	Missing	29	11%

Table 4-4. Student group demographics

Gender	Male	60	37%
	Female	104	63%
Ethnicity	Asian/Asian-American	2	1%
	Black/African-American	27	16%
	Hispanic/Hispanic-American	5	3%
	White/Caucasian	103	63%
	Other	5	3%
	Missing	22	13%
Parental Employment	Accounting, bookkeeping	15	11%
	Creative arts (writer, musician)	3	2%
	Driver (taxi, delivery, bus, truck)	3	2%
	Factory worker, construction	3	2%
	Food service, restaurant	0	0%
	Labor, custodial, maintenance	1	1%
	Missing	24	15%
	Professional, executive	37	23%
	Retail sales, customer service	8	6%
	Sales (real estate, commodity goods, etc)	3	2%
	Service technician (cars, appliances, etc)	0	0%
	Skilled craftsman (plumber, etc)	2	1%
	Social services, public services	17	12%
	Teacher	29	18%
Unemployed, retired, student, disabled	19	10%	
Household Income	Lower (< \$30,000)	8	5%
	Middle (\$30,000-\$60,000)	32	20%
	Upper (> \$60,000)	92	55%
	Missing	32	20%
Average Hours Worked During the Week by Parent	0-5	22	13%
	6-20	14	9%
	21-40	43	26%
	41-50	47	29%
	50 or more	19	12%
	Missing	19	12%
Parent's Educational Attainment	Less than high school	1	1%
	High school or GED	18	11%
	Some college, 2-year college/vocational	56	34%
	Bachelor's degree	34	21%
	Some graduate work	10	6%
	Master's degree	23	14%
	Doctoral degree	3	2%
Missing	29	11%	

Table 4-5. Reliability coefficients for survey variables

Variable	Reliability
Parent Report of Modeling	.91
Parent Report of Instruction	.88
Parent Report of Encouragement	.90
Parent Report of Reinforcement	.93
Student Perception of Modeling	.92
Student Perception of Instruction	.94
Student Perception of Encouragement	.91
Student Perception of Reinforcement	.92

Table 4-6. Results of regression one, exploring the relationship between achievement and encouragement, modeling, reinforcement and instruction.

R		R Square		Adjusted R Square		Std. Error of the Estimate		
0.09		0.008		-0.001		16.43		
Sum of Squares		df	Mean Square		F	Sig.		
Regression		969.91	4	242.47		0.89	0.46	
Residual		120,740.27	447	270.11				
Total		121,710.18	451					

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Zero-order	Correlations	
	B	Std. Error	Beta				Partial	Part
(Constant)	71.68	7.31		9.8	0			
Modeling	0.24	0.19	0.09	1.27	0.2	0.08	0.06	0.06
Instruction	-0.08	0.11	-0.05	-0.76	0.44	0.02	-0.03	-0.03
Encouragement	-0.01	0.13	0	-0.1	0.91	0.04	-0.005	-0.005
Reinforcement	0.06	0.14	0.03	0.43	0.66	0.06	0.02	0.02

Table 4-7. Results of regression two, exploring the relationship between student achievement and student encouragement, student modeling, student reinforcement and student instruction.

R	R Square	Adjusted R Square	Std. Error of the Estimate					
.24	.06	.02	13.18					
	Sum of Squares	df	Mean Square	F	Sig.			
Regression	1023.68	97	255.92	1.47	.21			
Residual	16871.19	101	173.93					
Total	17894.87							
	Unstandardized Coefficients		Standardized Coefficients		Correlations			
	B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part
(Constant)	68.26	8.09		8.43	0			
Modeling Instruction	0.002	0.412	0.001	0.006	0.99	0.18	0.001	0.001
Encouragement	0.14	0.36	0.09	0.37	0.7	0.21	0.038	0.037
Reinforcement	-0.18	0.47	-0.103	-0.38	0.7	0.2	-0.039	-0.038
	0.39	0.37	0.25	1.06	0.29	0.23	0.1	0.1

Table 4-8. Results of regression exploring the relationship between encouragement, modeling, reinforcement, instruction, student achievement and student encouragement, student modeling, student reinforcement and student instruction.

R	R Square		Adjusted R Square		Std. Error of the Estimate			
0.40	0.16		0.09		12.67			
	Sum of Squares	df	Mean Square		F	Sig.		
Regression	2,970.74	8	371.34		2.31	0.03		
Residual	14,924.13	93	160.47					
Total	17,894.87	101						
	Unstandardized Coefficients		Standardized Coefficients		Correlations			
	B	Std. Error	Beta	t	Sig.	Zero-order	Zero-order	Std. Error
(Constant)	71.17	14.37		4.95	0.000			
Modeling	-0.29	0.46	-0.11	-0.65	0.518	0.008	-0.067	-0.06
Instruction	-0.61	0.22	-0.44	-2.82	0.006	-0.13	-0.28	-0.27
Encouragement	0.26	0.25	0.16	1.07	0.289	0.06	0.11	0.10
Reinforcement	0.58	0.27	0.36	2.14	0.035	0.11	0.22	0.20
Student Modeling	-0.10	0.43	-0.04	-0.25	0.804	0.19	-0.03	-0.02
Student Instruction	0.30	0.35	0.20	0.86	0.391	0.21	0.09	0.08
Student Encouragement	-0.35	0.47	-0.19	-0.74	0.464	0.20	-0.07	-0.07
Student Reinforcement	0.42	0.36	0.26	1.15	0.255	0.24	0.12	0.11

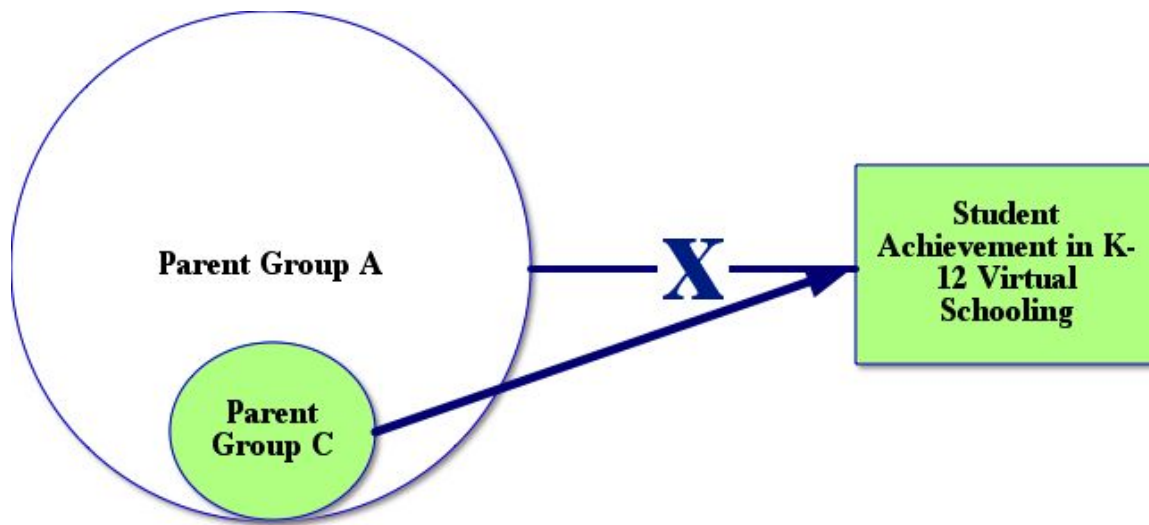


Figure 4-1. A representation of the conflicting results associated with research question 1.

Table 4-9. Mean reinforcement and instruction for parent groups B & C

Group	Factor	Mean	Standard Deviation
Parent Group B	Reinforcement	71.69	8.58
Parent Group B	Instruction	75.50	10.37
Parent Group C	Reinforcement	72.20	8.34
Parent Group C	Instruction	75.88	9.66

Table 4-10. Racial/ethnic data for parent groups B & C

Race/Ethnicity	Parent Group B		Parent Group C	
	n	%	n	%
Asian/Asian-American	7	1.50%	1	1%
Black/African-American	87	19.20%	14	13.70%
Hispanic/Hispanic-American	5	1.10%	2	2%
White/Caucasian	275	60.80%	67	65.70%
Other	14	3.10%	5	4.90%

Table 4-11. Wilcoxon W for parent groups B & C

	Asian/Asian American	Black/African American	Hispanic/Hispanic American	White/ Caucasian	Other
Wilcoxon W	21.00	2701.00	6.00	21736.00	45.00
Z	-2.45	-9.27	-2.00	-16.58	-3.61
Significance	0.01	0.00	0.05	0.00	0.00

Table 4-12. A summary of regression results, research question 1

Regression	Independent Variables	Results
1	Modeling, Instruction, Encouragement, Reinforcement	Non-significant relationship with student achievement
2	Student Modeling, Student Instruction, Student Encouragement, Student Instruction	Non-significant relationship with student achievement
3	Modeling, Instruction, Encouragement, Reinforcement, Student Modeling, Student Instruction, Student Encouragement, Student Instruction	Significant relationship with student achievement

Table 4-13. Descriptive statistics, student group and parent group C

Group	Factor	Dependent Variable	Mean	Std. Deviation	N
Student Group	1	Student Modeling	33.03	5.56	164
	2	Student Instruction	49.07	8.70	164
	3	Student Encouragement	39.87	7.46	164
	4	Student Reinforcement	44.68	8.20	164
Parent Group C	1	Modeling	54.85	5.57	164
	2	Instruction	76.68	9.66	164
	3	Encouragement	70.05	8.32	164
	4	Reinforcement	71.91	8.43	164

Table 4-14. Test of within subjects contrasts, student group and parent group C

Source	Student *		df	Mean Square	F	Sig.	Partial Eta Squared
	Parent	Factor					
Group (Student vs. Parent C)	Linear		1	233,985.10	1,510.37	0.00	0.90
Error(Student * Parent C)	Linear		163	154.92			
Factors		Linear	1	20,278.44	1,242.22	0.00	0.88
		Quadratic	1	19,935.62	821.36	0.00	0.83
		Cubic	1	23,817.19	1,189.33	0.00	0.88
Error(Factors)		Linear	163	16.32			
		Quadratic	163	24.27			
		Cubic	163	20.03			
Student * Parent C * Factor	Linear	Linear	1	1,451.47	110.51	0.00	0.40
		Quadratic	1	1,567.89	107.84	0.00	0.39
		Cubic	1	21.59	1.13	0.29	0.007
Error(Student * Parent C * Factor)	Linear	Linear	163	13.13			
		Quadratic	163	14.54			
		Cubic	163	19.16			

Estimated Marginal Means of With Subjects Anova

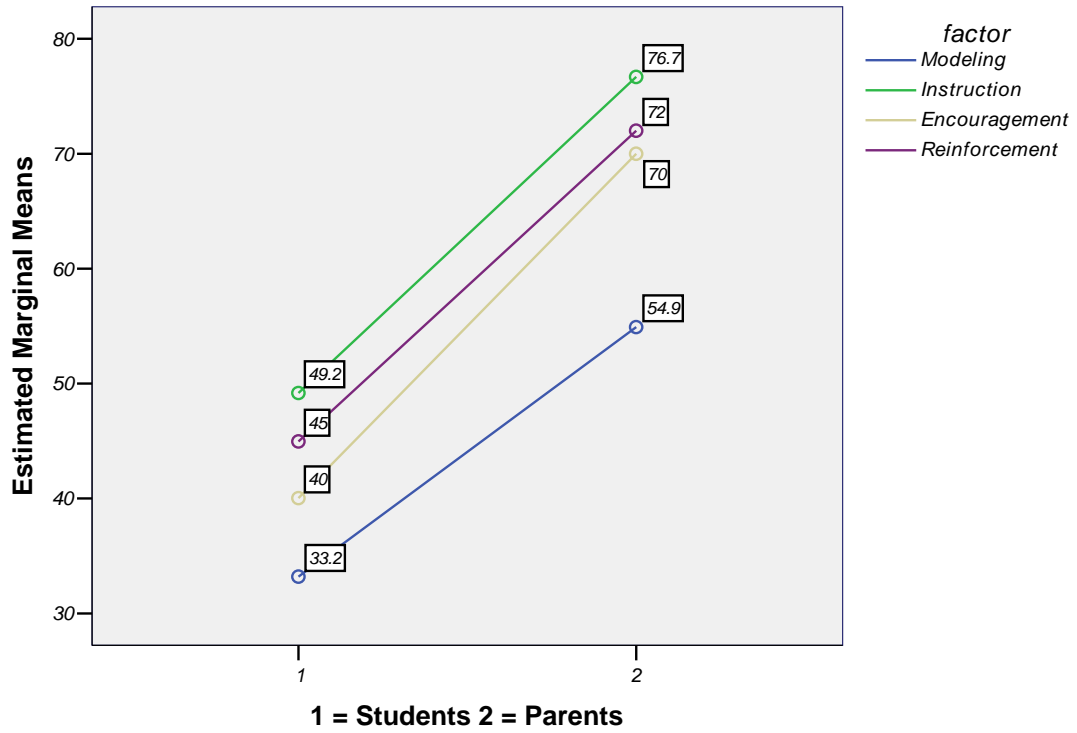


Figure 4-2. Visualizing the perceived differences in involvement between students and parents

Table 4-15. Correlations between parent and corresponding student study factors

Variable	Parent Modeling	Parent Instruction	Parent Encouragement	Parent Reinforcement
Student Modeling	.21*	-	-	-
Student Instruction	-	.20*	-	-
Student Encouragement	-	-	.19*	-
Student Reinforcement	-	-	-	.15

* $p \leq .05$

Table 4-16. Between subjects ANOVA: Student data with outlier

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender * Education	Student Modeling	501.81	5	100.36	3.71	0.004
	Student Instruction	1,134.44	5	226.88	3.44	0.007
	Student Encouragement	800.00	5	160.00	3.05	0.014
	Student Reinforcement	1,083.70	5	216.74	3.38	0.008

Table 4-17. Between subjects ANOVA: Parent data with outlier

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender *	Modeling	634.15	4	158.53	3.85	0.004
	Instruction	1,790.13	4	447.53	4.00	0.003
Race/Ethnicity	Encouragement	827.79	4	206.95	2.50	0.041
	Reinforcement	1,154.48	4	288.62	3.36	0.010

Table 4-18. Gender by income interaction (student factors)

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender * Income	Student Modeling	108.02	2	108.02	3.87	0.05
	Student Instruction	347.43	2	347.43	5.36	0.02
	Student Encouragement	276.86	2	276.86	5.51	0.02
	Student Reinforcement	440.23	2	440.23	6.61	0.01

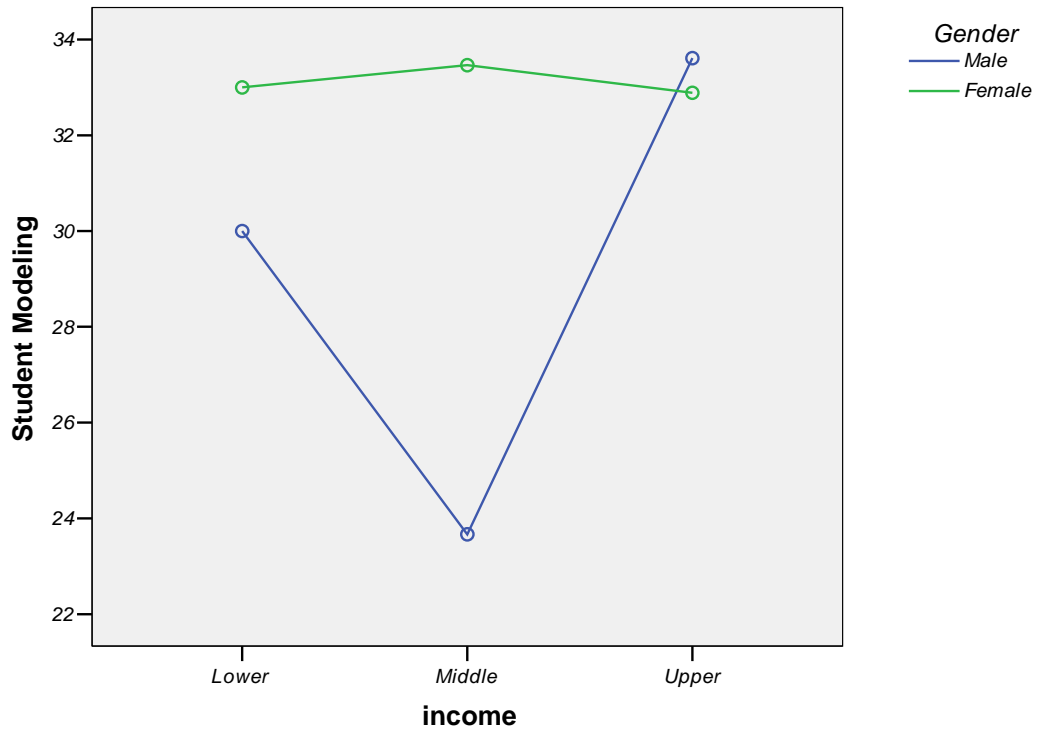


Figure 4-3. The interaction between modeling and student gender and income

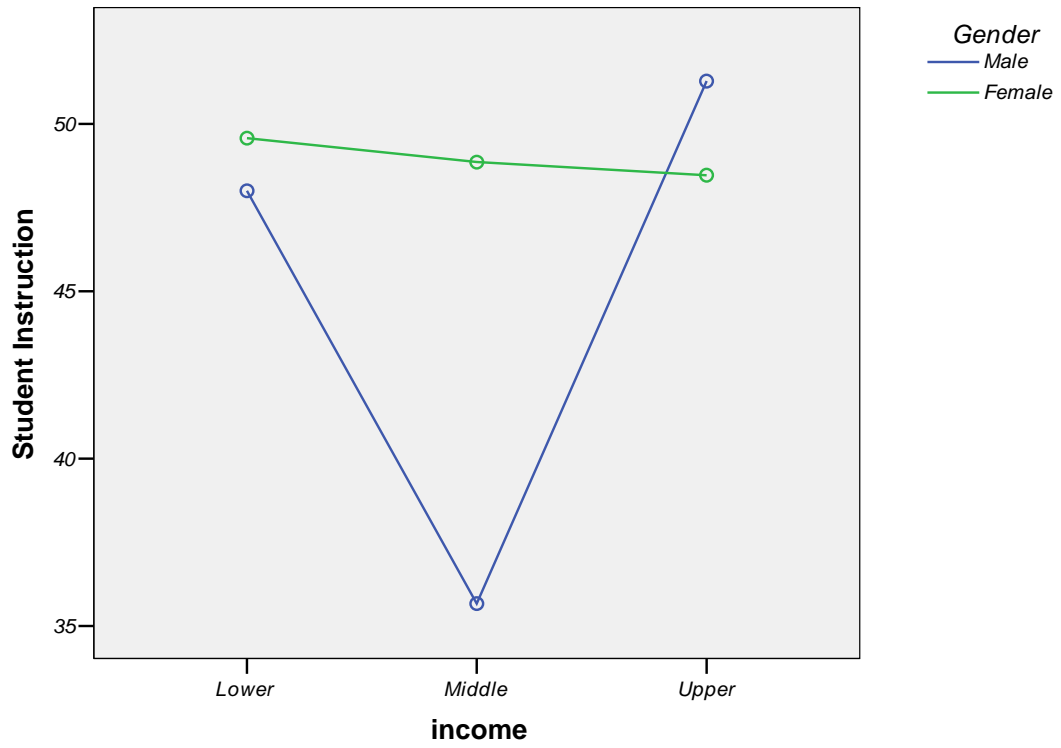


Figure 4-4. The interaction between student instruction and student gender and income

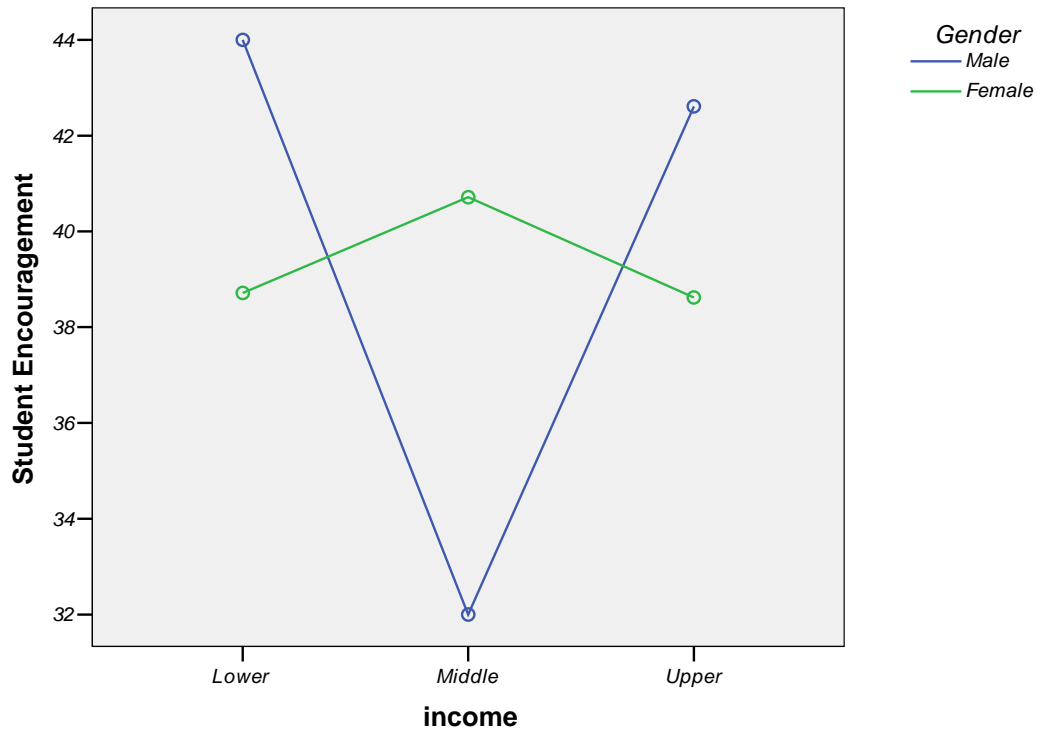


Figure 4-5. The interaction between student encouragement and student gender and income

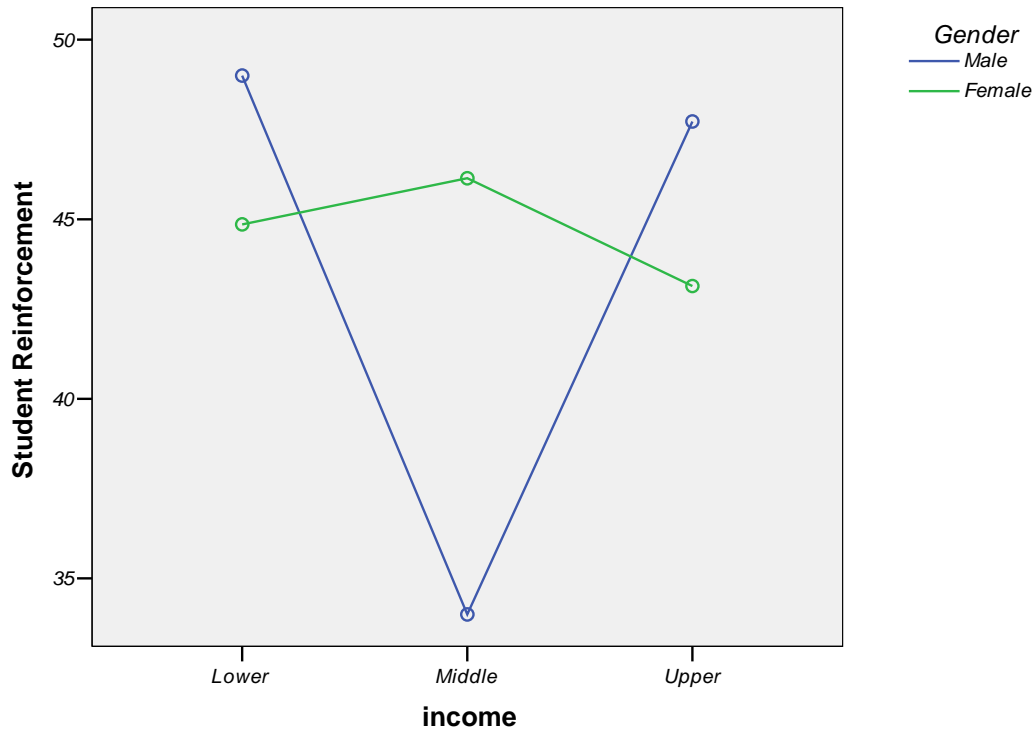


Figure 4-6. The interaction between student reinforcement and student gender and income

Table 4-19. Income main effect (Student instruction only)

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Income	Student Instruction	400.84	2	200.42	3.09	0.05

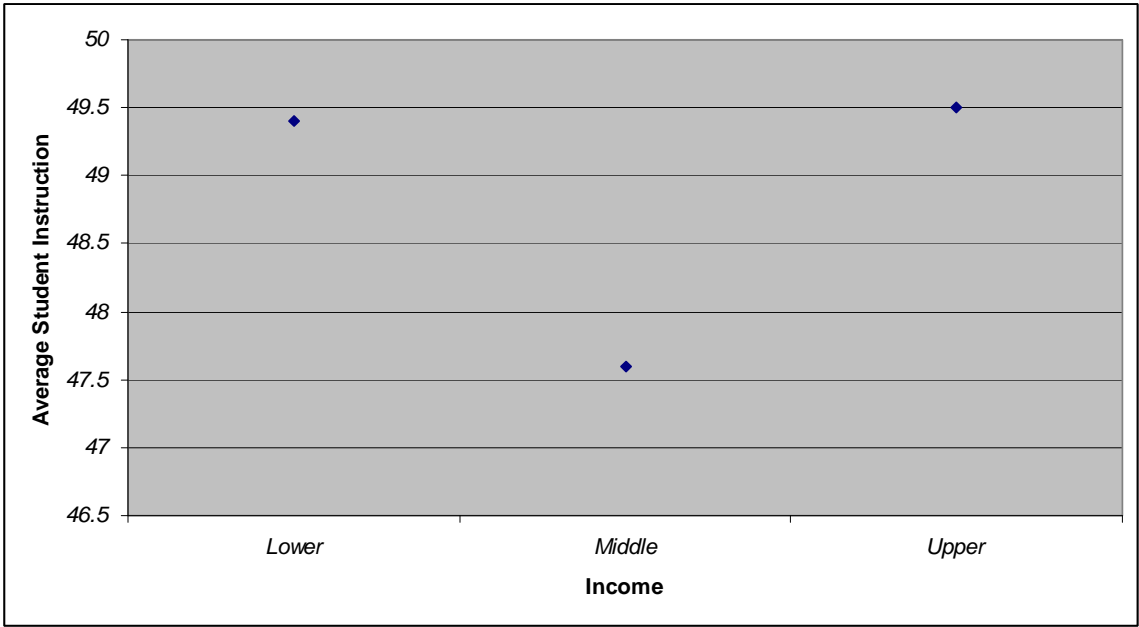


Figure 4-7. Income main effect for student instruction

CHAPTER 5 DISCUSSION AND IMPLICATIONS

Introduction

In an effort to understand the impact of familial involvement upon virtual school achievement, this study employed an online survey adapted from research by Hoover-Dempsey and Sandler (2005), sampling parents from the a virtual school in the Southeastern U.S. Presently, several virtual schools collect data from parents, utilizing the information to ascertain an understanding of parental attitudes toward virtual schooling and curriculum. Unfortunately, there are no published studies that empirically investigate this impact (Russell, 2004; Black, Ferdig & DiPietro, 2008).

A better understanding of factors related to online student achievement is of critical importance to K-12 online education (NCREL, 2002). Parental involvement is seen as a key component of other non-traditional forms of education, including charter schools and home schooling (Green & Hoover-Dempsey, 2007; Bulkley & Fisler, 2003). There is reason to suspect that family involvement also plays an equal, if not more important role in student achievement within U.S. virtual schools (Russell, 2004). In order to explore this concept, data was collected from a sample of virtual school students and their parents in a two-tiered fashion: Tier one targeted parents of virtual school students, tier two targeted the child enrolled in the virtual school related to a responding parent. Responses were analyzed and achievement data, in the form of a semester grade for the course (or average grade for the courses) in which the child was enrolled, was collected and evaluated in relation to the surveys. Quantitative statistical procedures were utilized to analyze the data. This chapter will discuss the outcomes and review the implications associated with the three research questions providing foundation to this study, these questions sought to examine the impact of familial involvement on student

achievement in K-12 virtual schooling, discern differences in student and parental perception of familial involvement in K-12 virtual schooling, and describe demographic factors that effect parental involvement in virtual schooling. The chapter will also discuss and review the implications associated with findings elicited by this study not associated with the three research questions; and finally, discuss and review the broader outcomes and implications associated with the results of this study.

Research Question 1

What quantifiable impact does familial involvement have on student achievement in K-12 virtual schooling? : Several researchers, including Del Litke (1998), Clark (2001), Russell (2004), Cavanaugh et al. (2004) and Rose and Gallup (2001) have postulated that parents play an important role in virtual student achievement. According to Russell, parents constitute the physical presence normally occupied by the teacher in traditional classroom environments. This study represents the first comprehensive empirical investigation of parents' effect on virtual school achievement. The results related to research question one, which seeks to quantify the effect of familial involvement, reveal conflicting outcomes regarding the impact of parental involvement on student achievement in the research sample. Data reveals that familial involvement was predictive of student achievement in a subset of parents (Parent Group C, Parents Whose Child Did Respond to the Survey, n=164). But, in the larger parent group (Parent Group A, All Parents, n=940) there was no statistically significant relationship between parental involvement and student achievement. Within Parent Group C, two variables, parent instruction and parent encouragement held statistical significance. Further, no link between students' perceptions of parental involvement could be made to student achievement. The conflicting results support Del Litke's (1998) assertion that the family's role and impact on virtual schooling

is considerably complex and confirm the myriad of ideas and strategies found in traditional schooling research regarding the role of the parent (Jaynes, 2005; Fan & Chen, 2001; McLaughlin, 2006).

In light of the results of this research study, it can be claimed that Russell (2004) may have overstated the role of the parent in virtual schooling. Though, it is worth noting that Russell was referring to students who were enrolled in virtual school for all of their academic curricula, the students involved in this study have the ability to take, at most, two online courses in a given semester. Thus, the majority, if not all, of students studied were receiving instruction in traditional schooling environments.

The lack of predictive effect between parental involvement and its four antecedent variables (parent reports of modeling, instruction, encouragement and reinforcement) in Parent Group C would, on the surface, seem to indicate that virtual schools could ignore parents and their contributions to achievement online. This could not be further from the truth, as will be discussed; there are several reasons why this result should not be held as doctrinaire. First, meta-analytic research by Fan and Chen (2001) and Jaynes (2007), while contradicting the previously disclosed non-predictive outcome associated with Parent Group A, provide evidence of the inconsistencies associated with quantitative research focused on parental involvement. Fan and Chen (2001) in particular discuss discretion that should be exercised when individual measures of achievement (eg: a singular course grade as was used in this study) are utilized as dependant variables due to their instability.

Second, a robust analysis of research by Desforges and Abouchar (2003) and Cotton and Reed-Wikelund (1989) provide indication that the most efficacious forms of parent involvement are active forms of involvement, those which encourage parents to interface directly with their

children on learning activities in the home. Active forms of involvement, which include phone calls with teachers, parent-teacher conferences and homeschool communication logs produce greater achievement benefits than passive forms of involvement. Unfortunately, these active involvement activities place a considerable burden upon teachers. While data was not collected regarding AVS course enrollments or student-to-teacher ratios, student-teacher ratios associated with other K-12 Virtual Schools can approach 185:1 (Florida TaxWatch, 2007). With such a large number of students it is nearly impossible for instructors to facilitate active, meaningful involvement and communication with parents. Virtual schools purport to facilitate involvement by providing parents entrée to their child's content, grades and other course information through access to the schools learning management system, however, there is no empirical data evaluating parental use of this information or its impact on student achievement.

Further, there is evidence that parental involvement declines as students approach adulthood (Eccles & Harold, 1996), which is particularly interesting as this study focused on secondary school students. This issue may account for some of the conflict evident in the results. Additionally, as reported in Chapter 4, Parent Group A contained a larger number of minorities as compared to Parent Group C. Research by Epstein (1990), Griffith (1998) and Lareau (1987) associate minority group membership with lower levels of parental involvement, possibly contributing to the non-significant nature of the results. Other variables unaccounted for in the study could also have contributed to the discrepancy. As discussed in Chapter 4, data pertaining to teachers, content and community was not collected, this information has shown to have considerable influence on parental involvement in traditional schooling (Eccles & Harold, 1996) and could have contributed to the non-significant relationship.

Finally, anecdotal evidence drawn from information published by the Florida Virtual School (Optimal Performance, Inc., 2007), provides indication that parental outreach programs that include nothing more than a monthly phone call to parents of virtual school students contribute to high levels of parental satisfaction. These satisfied parents can aid in a virtual school's efforts to market its services, turning parents into an effective public relations machine (Bulkley & Fislser, 2003; Lubienski, 2005).

When considering the other half of the conflicting result, the sample consisting of parent respondents whose children participated in the survey (Parent Group C), a relationship was found between parental involvement and student achievement. Within Parent Group C, two variables, parental instruction and parental encouragement, account for 9.4% of the variance found in a corresponding student's achievement, a number representing the approximate equivalent of one letter grade. Russell (2004) theorized that due to a virtual school instructor's lack of physical presence, a portion of the responsibility for a student's education is placed upon the family in a virtual schooling model. The outcomes evident with Parent Group C support Russell's thoughts. Further, these results mirror Antosca's (1996) research and partial results of Hoover-Dempsey and Sandler's (2005) studies. In these two examples (Antosca and Hoover-Dempsey and Sandler) parental perception of involvement held a significant relationship to student achievement. In order to further explore the outcomes associated with Parent Group C in research question one, the significant variables will be discussed individually.

Parental Instruction's Negative Relationship With Student Achievement

As previously disclosed, two variables comprising parental involvement were found to have significance within Parent Group C. The first variable, parental instruction, held a negative relationship with student achievement. That is, when parents reported engaging in more instructional activities with their child, the child's achievement scores decreased. Pomerantz,

Moorman and Litwak (2007) describe the limited number of studies that investigate the quality of home-based parental instructional strategies. When delving into this body of research concerning home-based parental instructional strategies, Fan and Chen (2001), Shumow and Miller (2001) and Ma (1999) report weak positive or even negative correlations with student achievement, supporting the research findings associated with this study. Presented with this evidence, quality of parental instruction could be the basis for the negative relationship between parent instruction and student achievement. Thus, it is plausible to conclude, based upon the data from the subset of parents in this study and a review of literature that parent instructional strategies were of limited and even negative value. This assertion is further supported by Hoover-Dempsey and Sandler (2005) who believe that parents of older children experience concerns about the limits of their personal knowledge and skill when assisting children with school work. These reservations may translate to substandard instructional practices.

An additional explanation for the negative correlation between parental instruction and student achievement may be that increased parental instruction occurs only after students are performing poorly in school. That is, parents begin to spend more time focusing on their students' achievement only after the student brings home sub-standard grades (Fan & Chen, 2001), too late to repair damage that has already been brought upon a student's grade in a specific course. As noted by Cotton and Reed-Wikelund (2001) parental involvement in academic activities decrease as students approach adulthood, with some parents reporting that participation in a child's homework is a tedious and undesirable activity (Griswold, Cotton & Hansen, 1986). Further, given the age of the population evaluated, a parent's insertion into the academic process may cause tension between a parent, who might be reluctantly participating in

the academic endeavor, and a child who is both exploring autonomy and may be struggling academically (Solomon, Warin & Lewis, 2002).

Parental Reinforcement's Positive Relationship With Student Achievement

A second outcome of this study indicates that parental reinforcement held a significant positive relationship with student achievement within Parent Group C. Indicating that as parents employed more positive reinforcement strategies associated with school work, academic achievement increased. Reinforcement, as conceptualized by Hoover-Dempsey and Sandler (2005), is defined by the behavioristic notion that actions occur and are maintained because of their consequences (Skinner, 1989). In the context of student learning, reinforcement theory predicts that children will repeat behaviors when they are consistently associated with receiving positive reinforcement (Hoover-Dempsey & Sandler, 2005). Support for parental reinforcement's positive relationship with student achievement, as seen in this study, can be found in contemporary literature associated with parental involvement (eg: Power, 2004; Martinez-Pons, 2001; Steinberg, 2001). According to Hoover-Dempsey and Sandler (1995) when parents engage in praise and positive reinforcement of behaviors such as listening and contributing in class, earning good grades, or the timely completion of homework on a consistent basis, the results are likely to increase the child's acquisition of skills and behaviors beneficial to school success. Others, including Yap and Enoki (1995) and Walberg (1984) similarly suggest that increased student achievement can best be achieved through parental supplementation of a student's school work at home, through monitoring and encouragement.

Implications Related to Research Question 1

Several implication for research, policy and practice can be drawn from the outcomes associated with research question one. These implications provide a roadmap for future investigation into the role and effect of parents on virtual school achievement. While family

involvement is uniformly recognized as an essential component of comprehensive academic programs, existing policies, including No Child Left Behind, are not formulated to reflect this (Harvard Family Research Project, 2008). Many of the problems associated with the translation of issues in practice concerning families and academics to policy mandates concerning family and academics center on the complexities associated with evaluation of familial involvement. Virtual schools have the opportunity to lead the entire educational field in the incorporation and adoption of specific, methodologically sound standards for the evaluation of family involvement. A comprehensive understanding of the impact of the family, communicated effectively to policy makers could have a tremendous impact on future virtual school funding. In order to facilitate this understanding several steps can be taken by virtual schools. Foremost, a longitudinal assessment of parental involvement's impact on students who participate in virtual schooling should be initiated. This assessment should not be limited to just survey data, the incorporation of qualitative data is necessary to build a comprehensive visualization of the role of the parent. Further, this qualitative data will assist in the triangulation of survey outcomes. Fan and Chen (2001) encourage the use of measures of achievement over time, as they provide a more reliable and valid construct for measure. Presently, there are several obstacles that impede a virtual school's ability to analyze student data longitudinally. One obstacle of particular importance to virtual school administrators and researchers is access to student data. Because many virtual schools are not diploma granting institutions, they do not have access to state and district level comprehensive student information. This may include data pertaining to standardized test scores, student disabilities, individualized education plans and disciplinary issues, information that can have critical impact on the manner in which a teacher delivers course content. When virtual schools are given access to state and district level databases, virtual school teachers will have the

opportunity to fully understand their students and virtual school administrators will have the ability to monitor student growth both within the context of the virtual school and traditional school environment.

Second, virtual schools should develop outreach strategies and formal guidelines for encouraging parental participation in the instructional process that are beneficial for students. Walker, Hoover-Dempsey, Whetsel and Green (2004) recognize two specific domains for parents to engage in teaching strategies, direct instances, in which a child may be engaged in homework and indirect instances, when a child is not engaged in academic activities, but a teachable moment arises (eg: measuring ingredients while cooking, calculating the amount of paint needed to cover a wall). Walker, et al acknowledge that parents may need support to develop strategies that will have positive impact on an individual student. For example, strategies that focus on direct instances may include creating and practicing with flash cards in an effort to memorize multiplication tables. Strategies that focus on indirect instances include encouraging a child to journal or write creatively or making parents aware of cultural or other learning opportunities available in their geographic area. Additionally, information on developmentally appropriate, content specific teaching strategies can help to build successful home-based parent instructional skills (Cancio, West & Young, 2004). Indeed, Shaver and Wallis (1998) linked workshops for parents on helping their children at home to higher reading and math scores.

In light of the geographic constraints associated with virtual schooling, and virtual schools' pre-existing multi and hyper-media infrastructure, institutions should utilize the Internet for delivery of parental instructional resources. The utilization of Internet-based instructional resources for parents has been successfully demonstrated with many different student populations, including those with disabilities (Ferdig, Amberg, Elder, Donaldson, Valcante &

Bendixen, in press; Ferdig, Amberg, Elder, Valcante, Donaldson & Bendixen, 2008). Similarly, Internet-based instructional resources can also be used to instruct parents on appropriate methods of parental encouragement relating to school work and achievement.

Future researcher should investigate the effect that providing parental access to student learning management systems and course materials has upon student achievement. At present, there is a general “if you build it, they will come” assumption in virtual schooling. As previously mentioned, parent LMS access constitutes a passive form of involvement; theoretically, it should not translate to significant achievement gains. Researchers should quantify the frequency in which parents access course materials, what they access and whether access to course information changes the manner in which parents interact with their children regarding academics.

Finally, future research should investigate parental knowledge and perceptions related to the processes of learning in online environments. This information could be used to better educate and diffuse parental misconceptions related to online pedagogy and learning processes experienced by students. Armed with an comprehensive understanding of the cognitive processes associated with proactive learning experience in virtual school courses, parents could potentially become better participants in the educational process.

Research Question 2

Do students and parents differ in their perceptions of familial involvement in K-12 virtual schooling? : In previous chapters, it was posited that the study of parental involvement and its relationship to virtual school student achievement could assist the development of new communication strategies between both homes and virtual schools and parents and virtual schools. These communications tactics would be used to facilitate interactions between virtual schools, teachers and parents. These interactions would, in turn, lead to improvements in student

achievement. To do so, it is necessary to quantify and establish a baseline for the perception of intra-family communication regarding academics prior to the development of these strategies. Research question two sought to do this by determining whether students and parents differ in the perception of familial involvement.

The analysis associated with this research question revealed that parents and K-12 virtual school students have statistical differences in their perceptions of the amount of involvement parents have in the students' academic work. The data provides evidence that students perceive a lower level of involvement in academic activities than parents. These results are analogous to data reported by DePlanty, Coulter-Kern and Duchane (2007) and Hoover-Dempsey & Sandler (2005). DePlanty et al's study indicates that parents have a tendency to perceive themselves as more involved in academics than both students and teachers. Hoover-Dempsey and Sandler (2005) describe weak correlative results between student perceptions and parent perceptions of parent reinforcement, instruction, modeling and encouragement, at .16, .16, .14, and .16 respectively. These results are quite similar to the correlative results elicited by this study and discussed in chapter 4. The results associated with question two will be discussed in terms of psychometric validity and social desirability, and within the context of the outcomes associated with research question one.

It is possible that the disparity in responses between parents and students exist due to validity issues inherent to the survey. It is useful to consider that the survey adapted for this study was designed for elementary aged students, and it should be acknowledged that some instruments designed to assess aspects of the parent-child milieu have been found to have questionable validity outside of specific age ranges (Troost, Biesecker, Stattin & Kerr, 2007; Locke & Prinz, 2002). After the survey was adapted it was subjected to a level of validation,

detailed in chapter 3, but this process did not include an empirical component. Therefore, a structured empirical validation process that includes a confirmatory factor analysis would provide insight as to the reliability and validity of the measurements associated with both students and parents. As researchers and practitioners adopt and transform conventional assessments for use in virtual schools, validity needs to be a constant concern. Within the confines of this study, it is possible that the survey, which made fundamental assumptions about the nature of respondent views about the definition of parents and students, provide context appropriate for elementary aged students but incongruent with more mature adolescents. Hoover-Dempsey and Sandler's survey was designed with a specific bias: that parents and children are talking about each other in exclusion of others. This bias would seem to directly contradict the very notions of family involvement described in chapter 1 by Pat Edwards (2004) as an omnibus expression broad enough to incorporate the myriad of family structures in practice in the U.S.

Additionally, it is plausible that some of the discrepancy associated with parent and student perceptions of involvement could be attributed to social desirable parent responses. Locke and Prinz (2002) discuss social desirability and its role in surveys that seek to detail aspects of the parent-child relationship, a concept harmonious with the notion that parental involvement is a form of social capital (Grolnick, Benjet, Kuriwsky & Apostoleris, 1997; McNeal, 1999). It is Locke and Prinz's assertion that additional research correlating survey responses with observational data would advance understanding related to the self-report of parent-child information.

Finally, when the results of this research question are placed within the context of the results of research question 1 (the relationship between parental involvement and student achievement) and Balli and Deplanty, et al's research it can be asserted that parents may indeed

be engaging in activities meant to support student achievement. Unfortunately, these activities may not be effective or enjoyable for students, as noted by the statistically significant parent instructional strategies variable, which was found to have a negative effect ($B = -.61$) on achievement. Given the wide disparity between perceptions of involvement held by parents and students, it is plausible that the efficacy of parent involvement may be hindered by a student's inability to comprehend and see the value of parent involvement activities. Additionally, contemporary theoretical and empirical literature suggests that a child's acuity in perceiving and comprehending a parent's academic involvement directly influence the effect of that parent's involvement on both student achievement and student psychological well-being (Hoover-Dempsey & Sandler, 2005; Flouri & Buchanan, 2003) Thus, an accurate perception of involvement is a contributing component to effective parent interventions.

Implications related to research question 2 : Results indicate that administrators, researchers and policy-makers who inquire about the role of the parent may receive different results based on who is asked. Thus it will be important for practitioners and future researchers to consider their target audience and triangulate results with qualitative data elicited from the audience. Further, research exploring the perceptual mismatch identified by this study is necessary; this research should seek to discern the antecedents of the discrepancy and whether these issues are endemic in virtual schooling.

Additional research should explore whether the inequities in parent and student perception of involvement may be based upon social desirable response patterns by parents. This social desirability issue, explained within the context of the social capital associated with education in contemporary American society by McNeal (1999) and Benjet, Kuriwiski and Apostoleris (1997), may account for the discrepancy in perceived responses between students and parents. Future

research should explore the perceptual disparity within the context of social desirability and social capital.

The survey utilized in this study should be subjected to a rigorous validation process that includes structural equation modeling in order to estimate the fit of the data. While the parent sample is comprised of a suitable number of participants, because of its limited sample size, accurately estimating fit with the student population will be difficult. An appropriate student sample should include at least 280 individuals (MacCallum, Browne, & Sugawara, 1996). Further, parent and student survey responses need to be triangulated with qualitative data in order to ascertain whether parents are indeed responding with a level of accuracy.

Virtual school administrators need to question whether parents are receiving timely reports and updates related to their students' progress and achievement in a course. As previously mentioned, often parents become involved in their child's academics only after the child is failing. Interactions between parent and child, potentially strained due to developmental concerns can be further exacerbated under an academically stressful environment. Researchers and practitioners need to develop consistent, reliable and relevant means for communicating student performance to parents. The incorporation of predictive analytical methods for student evaluation should be an area of increased interest and research within the virtual school community. Black, Dawson and Priem (2008) provide evidence that simple data logging applications can predict affective states related to student achievement in a sample with insufficient grade variability for direct achievement measure analysis. Similar research holds specific promise for direct translation to student achievement in virtual schools due to the high level of grade variability found in a majority of K-12 virtual institutions. Predictive analytics may assist in providing

parents, instructors, administrators and students with an early warning system related to academic achievement.

Finally, practitioners should consider building parent-student interventions based upon activities that students readily comprehend as valuable contributors to their academic success. These interventions could include targeted outreach to fathers. Fathers were overwhelmingly absent in our respondent population, providing an indication that they may represent an underutilized resource for their children. Given that virtual courses do not have to adhere to the traditional notions of time and space that are associated with face-to-face schooling, fathers and other working parents have increased opportunity for participation.

Research Question 3

Do factors including, socioeconomic status, race and gender, effect involvement of families in virtual schooling? : The results of question 3 reveal several distinct phenomena, (a) male student respondents in the upper (>\$60,000 annually) and lower income (< \$30,000 annually) categories perceived a higher degree of encouragement, modeling, instruction and reinforcement from parents than male student respondents in the middle income category (>\$30,000 < \$60,000 annually) and (b) female student respondents in the middle income category perceived higher levels of encouragement, modeling, instruction and reinforcement from parents than female student respondents in the lower and upper income categories. Finally, (c) a significant effect is found related to household income, where this income effect closely mirrors the interaction effects described previously, but it is a main effect, only concerning a single variable (household income). The main effect indicates that students in lower (< \$30,000 annually) and upper (>\$60,000 annually) income categories perceive greater levels of instruction from their parents than individuals in middle income categories (>\$30,000 < \$60,000 annually).

The research results reveal differences in student perception of parent involvement based on both the student's gender and household income. These differences are patterned by male students of lower and higher household incomes perceiving a greater level of parental involvement than male students of middle household incomes. Conversely, female students of lower and higher income households perceived lower parental involvement than female students of middle household incomes. In addition, when all other variables were held constant, household income was found to have an effect on the amount of parent instruction perceived by students.

It has been well documented that demography, particularly socioeconomic status, plays a role in the amount of involvement perceived by students and parents (Balli, 1996; Bracey, 1996; Brody, 1995). Henderson's (2006) research indicates that some parents, particularly those from lower socioeconomic strata may feel uncomfortable questioning the nature of an assignment or discussing general concerns regarding their child's academic performance.

Research by Ritblatt, Beatty, Cronan and Ochoa (2002) discusses the importance of school personnel's sensitivity to parents' situations, including their cultural and physical environment. Further, Ritblatt et al note that socioeconomic status plays a significant role in parents' school involvement activities. Their findings indicate that parents in lower income groups spent less time involved in school-based extracurricular activities, perhaps due to work obligations. Interestingly, these lower-income families spent more time working directly with their child on academic concerns than those families in middle or high-income groups. While this pattern is not specifically seen within the data from this research study, it is possible that the limited sample size and lack of specific acuity present in the income independent variable may have limited the researcher's ability to discern a similar model.

Given the outcomes associated with research question three and the conflicting results associated with gender, it would seem that a virtual school's lack of physical facilities do not necessarily provide a specific parental involvement advantage to individuals based upon economic status. This outcome runs contrary to McGrath and Kuriloff (1999). But, when gender is held constant, we find that lower and upper income parents engaged in similar patterns of instructional activities, an outcome supported by Kozma and Shank (1998). Unfortunately, as evidenced from research question one, these instructional activities were not found to have a positive influence on student achievement.

Implications related to research question 3 : The results of question three seem to provide the opportunity to address whether virtual schools are truly bridging the digital divide. Hoover-Dempsey and Sandler (1995) downplay indicators of family status in efforts to understand parents' involvement decisions. The conscious choice to disregard demographics may have been an appropriate choice with elementary age students. Future research should discern whether demography plays a more expansive role, as evidenced by the results of question three, in the exploration of familial involvement in traditional secondary students and virtual students. This future research should include qualitative follow-up with respondents to gain a deeper understanding of the motivations behind participation in virtual courses.

In addition, future research should call into question the notion that a virtual schools lack of physical facilities inherently promotes parental involvement (Kozma & Shank, 1998). This is particularly salient in situations similar to the Virtual School, where students are not afforded the opportunity to be 100% online.

A robust analysis of the role of demography, including race, gender and socioeconomic status and its effect on virtual school student enrollment, achievement and parental involvement

should be initiated. Future research should employ a more granular stratification of socioeconomic status than utilized in this study. For example, additional income strata may promote more variability within the data. In addition, researchers should seek to focus on both quantitative and qualitative methodologies, to triangulate and confirm the validity of statements from both students and parents (Locke & Prinz, 2002).

Respondents to the survey represented a racially diverse, but predominantly white group. The majority of respondents were educated, professional females who came from households that earn \$60,000 or more annually. We were given empirical evidence that the majority of households participating in the study earned more than the median household income in the state, reported by the US Census Bureau as \$42,679 (2008). This data does not discourage the notion that in the Virtual School, as with other K-12 Virtual Schools in the U.S., equal access is an issue. A consistent criticism of K-12 online schools is that they are attended by individuals with higher household incomes (Watson, 2007).

The demographics of parent and student respondents, detailed in Tables 5.1 and 5.2, mirror the demographics described by Clark and Blomeyer (2007) and featured in Table 5.3, in their external evaluation of the Virtual School. The AVS constituency is diverse, but it does not yet emulate the diversity found in the traditional school population in the state, which is represented by a 47% non-white population (Department of Education, 2008).

In an effort to determine geographic distribution of study respondents, respondent zip codes were collected and mapped utilizing ESRI ArcGIS. ArcGIS is a geographic information system that allows for the multidimensional representation of data with geographic components. The map, Map 5.1, reveals that many of the participants in this study hailed from urban areas, this geographic phenomenon may potentially bias the data. Geography needs to be considered in

both the present and future discussions of virtual school student demography. Without the ability to visualize the respondents to this survey, it could be incorrectly concluded that the respondents were representative of students in the state. GIS provides the opportunity to view respondents from a geospatial perspective, allowing for the consideration that the majority of respondents were clustered in higher density urban locales. This geographic visualization also assists in calling into question another commonly held belief: that virtual schools are impacting students in rural areas (Watson & Ryan, 2007; Mills & Roblyer, 2004; USDOE, 2007).

In order to address issues associated with geographic, economic and minority representation, AVS and other institutions should reconsider its admissions process. AVS and several other institutions currently admit students on a first-come-first-serve basis. This process may inadvertently keep minority, rural and students from lower socioeconomic strata from enrolling in AVS courses. In order to counter the possibility of unequal access, AVS and other institutions choosing to enroll on a first-come-first-serve basis may want to institute a lottery program for over-subscribed courses. Lottery programs have been successfully utilized in Milwaukee, Wisconsin in order to manage enrollment in a popular school choice voucher program (Greene, Peterson & Du, 1999).

Derivative Outcomes

Ancillary findings, not related to the three research questions became apparent through the investigation and analysis of data. These findings provide specific opportunity to impact virtual school practice, research and policy and fall into two categories, outcomes related to the survey and outcomes related to the study population.

Outcomes Related to the Survey

Black, Ferdig & Dipietro (2008) call for the exploration and use of appropriate surveys from traditional K-12 research in virtual schools. Black et al. discuss the caution that should be

exercised with this process, as there are significant differences between K-12 face-to-face and virtual schools. The incorporation and augmentation of Hoover-Dempsey and Sandler's (2005) survey gave opportunity to exercise Black et al's call, as the survey, designed for and used in conjunction with investigations of elementary and middle school family involvement research, had not been used in conjunction with a population of secondary school students. Further, it had not been used in an online format or with students in non-traditional schooling environments like virtual schools.

The data described in Chapter 4 reveals that the survey proved to be a reliable instrument, with Cronbach's Coefficient α ranging from .89 - .93 across the four variables constituting parent's perception of involvement and .92 - .95 across the four variables constituting student's perception of involvement. These reliability figures provide empirical evidence that there is a minimal amount of random error associated with the results generated by this study. The reliability figures also closely emulate the figures reported by Hoover-Dempsey and Sandler (2005). It is important to note that Hoover-Dempsey and Sandler's survey was revised with the exclusion of questions from the parent survey pertaining to face-to-face school involvement. Two factors influenced the reduction of the Hoover-Dempsey and Sandler Model: geography and existing research. Given that virtual schools do not have a physical location, there are specific limits to a parent's ability to self-involve specific to the virtual school. Based upon the results of the survey it can be asserted that the alteration made to the original format of the survey did not have an effect on internal consistency.

Outcomes Related to the Study Population

Utilizing a list compiled by the Virtual School, 10,169 parents were contacted via email with a request to take part in this study, 940 parents responded representing a 9% survey response rate. 665 of the 940 responding parents approved their child's participation in the study.

Of these eligible students, email addresses for 485 were obtained through cooperation with the Virtual School and Department of Education. Out of the 485 students contacted via email with a request to take part in the second phase of the study, 164 students participated in the student survey. This represents a 36% response rate associated with the students.

Further analysis of the email solicitation made to parents reveals that of the 10,169 email invitations, 2270 solicitations, representing 22% of the study population, were sent to email addresses no longer utilized. 212 parents, 2% of the study population, requested that their names be removed from the list of survey participants by utilizing the 'opt-out' feature embedded in the email solicitation; these individuals and their corresponding students were removed from the study's email roster. When individuals associated with unreachable email addresses are eliminated from the overall invitation figures, the parental response rate rises to 11.8%. Though there is no literature that has established a benchmark for web-based survey response, response rates associated with parents for this survey were low as compared to rates discussed by Cook, Heath and Thompson (2000), but fall in line with those reported in Manfreda, Bosnjak, Berzelak, Haas and Vehovar's 2008 meta-analysis. Manfreda et al's study reviewed 45 different content non-specific cases in which web-based surveys were utilized, their findings detail a range of response rates, from 11% to 82%. Often, unsolicited mass emailing, such as those utilized by this research study, are associated with SPAM and phishing, reducing legitimacy and leading recipients to be wary of participating (Tuten, 1997; Porter & Whitcomb, 2003). According to Dillman (2007) and research by Kent and Turner (2002) there is statistically significant evidence that web-based surveys that include a pre-notification email receive more responses than those that do not utilize pre-notification. This pre-notification email provides a potential participant with a sense of legitimacy. Unfortunately, the Zoomerang application utilized for this study does

not feature the ability to send a pre-notification to potential participants. This lack of pre-notification may have led to decreased participation.

Given the relatively low level of participation by parents comprising the study population, it is necessary for AVS and other virtual schools to investigate email practices that are currently employed by teachers and administrators. Evidence indicates that many individuals experience ‘email overload’, characterized by overflowing email in-boxes and the stress of attempting to respond to this deluge of communications (Whittaker & Sidner, 1996; Jackson, Burgess & Edwards, 2006). Additionally, research indicates that email users develop patterns of responsiveness based upon reciprocity and perceived communicative value. Over time, the perception that an email sender’s communications have little value or are non-reciprocal will hinder participation (Tyler & Tang, 2003). Non-response to email can also be associated with poor email communications practices, these communications practices compound over time, leading individuals to develop a negative opinion of all communications emanating from the specific source. Because email is a critical communications medium for K-12 Virtual Schools, administrators should consider implementing email policies and trainings to maximize the utility of email communications sent to recipients, including, co-workers, students and parents. Jackson, Burgess and Edwards (2006) recommend developing trainings that target the following areas for more effective email communications: (a) Is an email message necessary? (b) Effective targeting of your email (c) Effective subject lines (d) Getting your message across and (e) Sending attachments.

An additional area of concern involves the number of email addresses for students that could not be located. As noted in Chapter 4, 180 of the 665 email addresses needed to contact student participants could not be located. These 180 individuals represent 27% of the potential

student respondent population. Reasons for the data loss are unclear, though interactions with AVS have provided evidence that a comprehensive student management system either does not exist or is inadequate. Such a system would provide tracking and maintenance of students from the time of their application to the end of their association with the AVS. AVS and other virtual schools may benefit from the experience of the Florida Virtual School (FLVS), who, after experiencing tremendous growth in its population developed a student management application called Virtual School Administrator (VSA). FLVS describes VSA as a performance management system which is “designed specifically to meet the unique needs of organizations providing online learning opportunities to students, VSA is a dynamic, performance-based system developed to provide program administrators with the tools they need to effectively manage the successful operations of an online learning program. In creating VSA, FLVS has built a comprehensive solution for tracking overall performance through monitoring activities in four areas: student performance and data management; student registration and enrollment management; role-based reporting; and communications” (Florida Virtual School, 2006, 1).

Implications Related to Derivative Outcomes

The high reliability elicited in this study provides evidence that the survey utilized is a reliable instrument that should be considered in future research investigating the role of parents in Virtual School achievement. It is important to note that the validity of this instrument has not been investigated, though the results reported in chapter 4 and discussed in this chapter indicate that a level of generalizability exists with outcomes described by Hoover-Dempsey and Sandler (2005). This generalizability is one aspect of the evidence that will be necessary for validity to be concluded. Thus, future researchers should work to build a body of evidence that will provide affirmation of the reliability statistics reported in this study and substantiation of the

assessment's validity, both through use of generalizability and using criterion related validity. This is, correlating outcomes with other measures of parental involvement.

It goes without saying that the logistics involved in a comprehensive survey are heady. Even with the assistance of databases and online survey applications, the process of cataloging and matching student and parent responses is a complex undertaking that should be avoided unless absolutely necessary. Outcomes from this study, if accepted unconditionally, indicate that future inquiry into the role of the family could derive efficiency through the exclusion of student surveys. This study found that student perceptions had little impact on student achievement. Unfortunately, students were much more receptive to responding to the survey as compared to parents. Further, the outcomes provide evidence that a quantitative investigation may not be the most effect manner by which to solicit valid parent information. In light of these issues and the aforementioned complexity associated with parental involvement research, future researchers should consider looking towards focus groups built upon stratified parent samples and individual interviews to discern the prevalence and process by which parents are participating in their child's virtual education.

Virtual schools must employ a modular data infrastructure that has the ability to track and update changes in student contact data. This data infrastructure should include a dedicated student information system (SIS) such as VSA or BocaVox's Maestro. SISs streamline and automate the process of updating student data. Further, student contact information should be verified on a regular basis to prevent instances in which a student or parent is unable to be contacted. Emergencies can occur, even in online environments, a prime example is provided by DiPietro (2008) who describes an incident in which a virtual school student posted suicidal ideation in an online course forum. Due to the prompt actions taken by the virtual school

instructors and staff and accurate contact information related to the student, appropriate help was provided in a timely manner.

At the present time the federal government and the majority of state governments have not initiated oversight or reporting guidelines for virtual schools. Instead, government is relying upon traditional school data infrastructures to maintain records and student accountability information. Recent developments in several states, including Colorado, Wisconsin and Pennsylvania provide examples where virtual schools, in environments of lax oversight, could not justify or provide specific evidence of the benefit they provide to their constituency. Specifically, the Trujillo commission, which was convened to address issues associated with the state department of education in Colorado's administration of virtual schools, found "individual student data were insufficient to facilitate a meaningful evaluation of online student assessment scores or attrition rates" (Donnell-Kay Foundation, 2007, p. 4). The Trujillo commission's report and subsequent recommendations for virtual schools should be used as a template and guideline for state departments of education to effectively manage and appropriately account for the growth and oversight of virtual schools until federal guidelines for oversight, data collection and data reporting can be developed and initiated.

Finally, further research needs to be conducted seeking to explore the relationship between virtual school achievement and socioeconomic status, race, gender and the role of the parent. An additional variable that should be considered is geography. Evidence exists that the geographic makeup of the sample in this study was highly skewed towards urban and suburban students (see chart 5.4). While GVS and most K-12 virtual schools do indeed serve diverse student populations, they could be doing more to encourage additional minority and rural enrollments. AVS in particular, has a unique history of engaging schools in a missionary style, that is,

conducting informational education and outreach in school districts to inform interested parties about their services. These outreach activities have included targeting school administrators, counselors, teachers, parents and students (Ferdig & Cavanaugh, in press). Additional resources should be dedicated to these missionary-style activities to increase rural and minority enrollment. Other virtual schools should consider the missionary approach that has enabled AVS to establish diversity.

Broad Outcomes Associated With This Study

In the process of conducting and analyzing the data produced in this study, several broad-based outcomes that could be applied in research, policy and practice became apparent. These five outcomes touch upon notions of contemporary theory, homeschool and intra-school communications and technological development.

Results associated with research questions 1 and 2 provide evidence that, within the context of virtual schools, it is may not be appropriate to rely upon the notions of technological and psychological transference posited by Reeves and Nass (1996). Reeves and Nass postulate that computers are treated as social actors by users. Thus rules which people apply to social interactions with people should apply equally well to their interactions with computers. As evidenced by this study and by research by Black, Greaser and Dawson (2008) the subtle differences found between outcomes and interactions amongst individuals, technology and corresponding others when comparing traditional and online venues reveal a complexity easily ignored by the blanket application of Reeves and Nass' theory. Overlooking this complexity, a process that is not difficult given the relative dearth of empirically based research in virtual schooling, has the potential to relegate online teaching and learning to an antiquarian state, one that ignores much of the progress made during the last 20 years by assuming that all online learners are the same.

It may be appropriate to further situate future conversations about virtual schooling in a broader theoretical context. This context should acknowledge the multiple complex interacting layers associated with today's virtual schools. An ecological approach provides one framework for exploring this type of environment (Bronfenbrenner, 1979, 1955). This theory of human development and interactions considers the way relationships within the family and between the family and social environment influence individual development and family functioning (Bronfenbrenner, 1979). From an ecological perspective, the most logical model of a family is as a system. Accordingly, a majority of researchers now view the family from what could be termed a "systems perspective" (Kreppner & Lerner, 1989). Bronfenbrenner's (1979) ecological perspective views human development and interactions from a systemic perspective. His theory combined sociology and developmental psychology, asserting that the relationships between individuals and their environments are viewed as "mutually shaping." Bronfenbrenner asserted that the individual's experience was likened to "a set of nested structures, each inside the next, like a set of Russian dolls" (Bronfenbrenner 1979, 22). According to Bronfenbrenner when studying human interactions, one has to see within, beyond, and "across" how the several systems interact (family, workplace, and economy). By viewing virtual schools from this systemic or ecological perspective it is possible to postulate that the category of the 'other' as described by Black, Ferdig and DiPietro (2008) may play a significantly large role in the success or failure of a virtual school student. Given the dominant role ascribed to the 'other' category in an ecological model, there is a critical need for additional evaluative instruments to enable outcomes-based research in virtual schooling. These instruments should be reflective of the diversities inherent in K-12 virtual schooling and should seek to describe the manner in which factors external to the student effect student achievement (Black, Ferdig & DiPietro, 2008).

In traditional schooling environments, teacher outreach that includes active involvement practices such as: parent teacher meetings, regular progress updates and a consistent exchange of learning materials between the home and school result in improved student performance (Westat & Policy Studies Associates, 2001). Effective outreach practices that include prosocial academic modeling and instructional activities should be incorporated into a comprehensive support package for virtual school parents. This package should include a clear and direct line of communication to the student's virtual school teacher, a point of contact for technical issues and concerns and the opportunity to interact with other parents of virtual school students. This interaction could be facilitated through an online forum for virtual school parents. Research by Romiszowski and Ravitz (1997), Tiene (2000) and Ferdig and Roehler (2003) has promoted the importance of the flexibility and convenience that discussion boards offer, as they are accessible to any individual with a computer and Internet access. In addition, discussion boards allow those who are less outgoing to have the space and time necessary to speak their mind (Chong, 1998; Dutt-Doner & Powers, 2000). The development of a parent forum could lead to more complex forms of parental engagement, for example, the formation of parental advisory committee to serve as a liaison between parents, teachers, students and virtual school administration.

Hoover Dempsey and Sandler (1995); Hoover-Dempsey, Walker, Sandler, Whetsel, Green, Wilkins and Closson (2005) and Baumrind (1971; 1991) suggest that both explicit and implicit student solicitations for parental involvement in academic work have the potential to prompt parental action. Student requests for assistance may be either explicit, such as a direct request for parental assistance, or implicit, such as a parent noticing signs of a child's frustration or receiving notification from a teacher. A parent who understands that his/her child is struggling in a specific course or content is often more likely to closely monitor homework (Hoover-Dempsey,

et al, 2005). The problem is communicating this information to parents who lead busy lives and have obligations related to work, home and other children. Many virtual schools seem to feel that by allowing parents the ability to access course materials and monitor progress they are fulfilling their obligation towards promoting communication between school and parent. Unfortunately, as previously stated, there is no empirical data that has been published related to parent access and whether this access translates to gains in achievement. Research by Abouchaar (2003) and Cotton and Reed-Wikelund (1989) allows us to generalize that course access, as a passive form of involvement, would not have as dramatic effect as more active forms of involvement. This does not mean that parent access should not be a part of a communications strategy, it should, but the cornerstone of a parent-school communications strategy, whose purpose is to increase achievement, should involve active forms of involvement (eg: parent-teacher conferences, phone calls to update parents regarding student progress).

In order to establish regular communications and feedback virtual schools should make use of the inherent automated affordances of learning management systems. LMSs can be used to track student activity automatically. While no LMS on the market currently automates communication of course related data, it would not be particularly difficult to design a system that would send out periodic updates to parents and other concerned individuals on a regular basis via email or SMS (Black, Dawson & Priem, 2008). In this manner, parents could be informed of their student's progress in a course, or of course activity and inactivity over a specified period of time. This process of regularly updating parents could eliminate the last minute, hectic scramble to fix a sub-par course grade.

The utilization of online technologies, including learning management systems and the dissemination of training materials to parents should not be constrained to virtual schools.

Traditional schools can benefit from the structure and utility that a learning management system can offer to students. With access to course materials and classmates via a learning management system, students would be provided with a controlled, safe environment for group activities, out-of-class discussion and assignments. This same learning management system could be used to disseminate training and information to parents, circumventing the cost and time delay associated with mailings or sending important materials home through students.

Additional Framework for Research: Understanding the Variability Associated with Virtual Schools in the United States

It is important for readers to consider the present state of K-12 virtual schooling in the U.S. and its inherent variability. 42 states currently fund state led virtual schools programs, no two states has a similar management or bureaucratic structure (Watson & Ryan, 2007). The inconsistencies associated with these institutions provide unique challenges for individuals who seek to understand this contemporary medium for learning. Prior to generalizing the results of this study there are several critical points that must be addressed. First, readers should be reminded that the virtual school studied in this dissertation does not allow full-time student enrollment. Students are limited to enrollment in two courses during a given semester. Second, the virtual school studied is not a diploma granting institution, thus it must report course grades for student to the traditional school in which the student is enrolled. The traditional school has the option of adjusting virtual school grades in any manner it wishes before publicizing them to the student. It is unknown whether the traditional schools made adjustments to students' final grades. Additionally, a broad definition of the parent was utilized for this study; this definition derived from Edwards (2004), incorporates the multitude of different family structures in existence in the U.S. today. Finally, this research was conducted through contact with the virtual school's parent or legal guardian of record. It is possible that the individual who responded to the

survey was not the person or family member who provided the majority of academic assistance to the student. Future research should investigate the ‘new’ family structure that Edwards describes and whether these non-traditional family units have unique means of interacting with students and schools.

Conclusion

This dissertation explored the impact of familial involvement upon virtual school achievement utilizing a sample of parents and students from a state led virtual school in the Southeastern United States. Outcomes of this study have specific implications for researchers, policy-makers and practitioners.

Results indicate that familial impact is a complex construct which may not be effectively measured utilizing quantitative methodology independently. Therefore, future research seeking to explore familial impact should incorporate mixed methodology (quantitative and qualitative methods) and a longitudinal assessment strategy. In order for engagement in an effective longitudinal study, virtual schools must provide researchers with the ability, amongst other things, to track students longitudinally. Data infrastructures must be improved to provide seamless access to comprehensive student information. Educational policymakers, either at the state or federal level, may ultimately be the impetus for the integration of the multiple educational data systems that exist in some states in the U.S. The establishment of a comprehensive student data infrastructure will take time and a considerable amount of money. Until this can be accomplished virtual school practitioners must also take a more progressive role establishing and maintaining virtual school student and parent information. A starting point for this process is the adoption and utilization of a student information system. The SIS will serve as a foundation for maintaining accurate information about current and former students.

Results associated with a subset of the parent sample indicate that parental instruction has a negative effect on student achievement and parental encouragement has a positive effect on student achievement. Practitioners seeking to increase the role of the parent in virtual schools should consider building media applications to provide instruction to parents on age appropriate educational interventions aimed at improving the effectiveness of parent instruction and encouragement activities.

Outcomes indicate that socioeconomic status plays a key role in the level of involvement parental involvement perceived by virtual school students. Further, gender and a parent's level of education also effect the amount of parental support perceived by students. It is important to consider that these two outcomes must also be paired with finding that indicate parents and corresponding students perceive very different amounts of parental involvement. Future research should investigate the validity of the survey utilized in this study. In addition, practitioners seeking to encourage and improve parental involvement in their child's virtual school education should look to direct involvement activities, such as parent-teacher conferences, the creation of a parent advisory committee or establishing a forum for virtual school parents to discuss topics pertaining to their children. Further, virtual school instructors with a large student to teacher ratio are inhibited from engaging parents in a meaningful and thoughtful manner. The process of making 180 phone calls every month to virtual school parents may in-effect turn a teacher into the equivalent of a telemarketer.

Finally, practitioners and researchers need to utilize learning management systems to their full capacity. The investigation and construction of LMS applications that provide analytical capabilities in the learning environment will allow the instructor to spend more of his or her time

engaging students in rich and meaningful discourse rather than policing message boards or trying to ascertain the level of student engagement in a non-empirical fashion.

K-12 virtual schools are still a relatively novel concept for the vast majority of American households. A growing cadre of researchers is working to understand the nuances associated with educating children and adolescents in an online environment. This dissertation should serve as the starting point for a more detailed and comprehensive conversation concerning the role of parents and their impact on student achievement in virtual schooling.

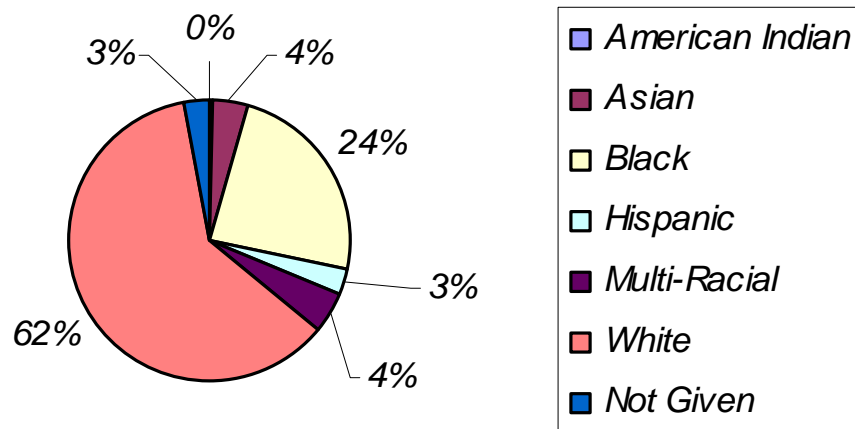
Table 5-1. Parent respondent race/ethnicity

Asian/Asian-American	21	2%
Black/African-American	172	18%
Hispanic/Hispanic-American	20	2%
White/Caucasian	561	60%
Other	21	2%
Missing	145	15%

Table 5-2. Student respondent race/ethnicity

Asian/Asian-American	2	1%
Black/African-American	27	16%
Hispanic/Hispanic-American	5	3%
White/Caucasian	103	63%
Other	5	3%
Missing	22	13%

Table 5-3. AVS enrollment by ethnicity, Fall 05 – Summer 07



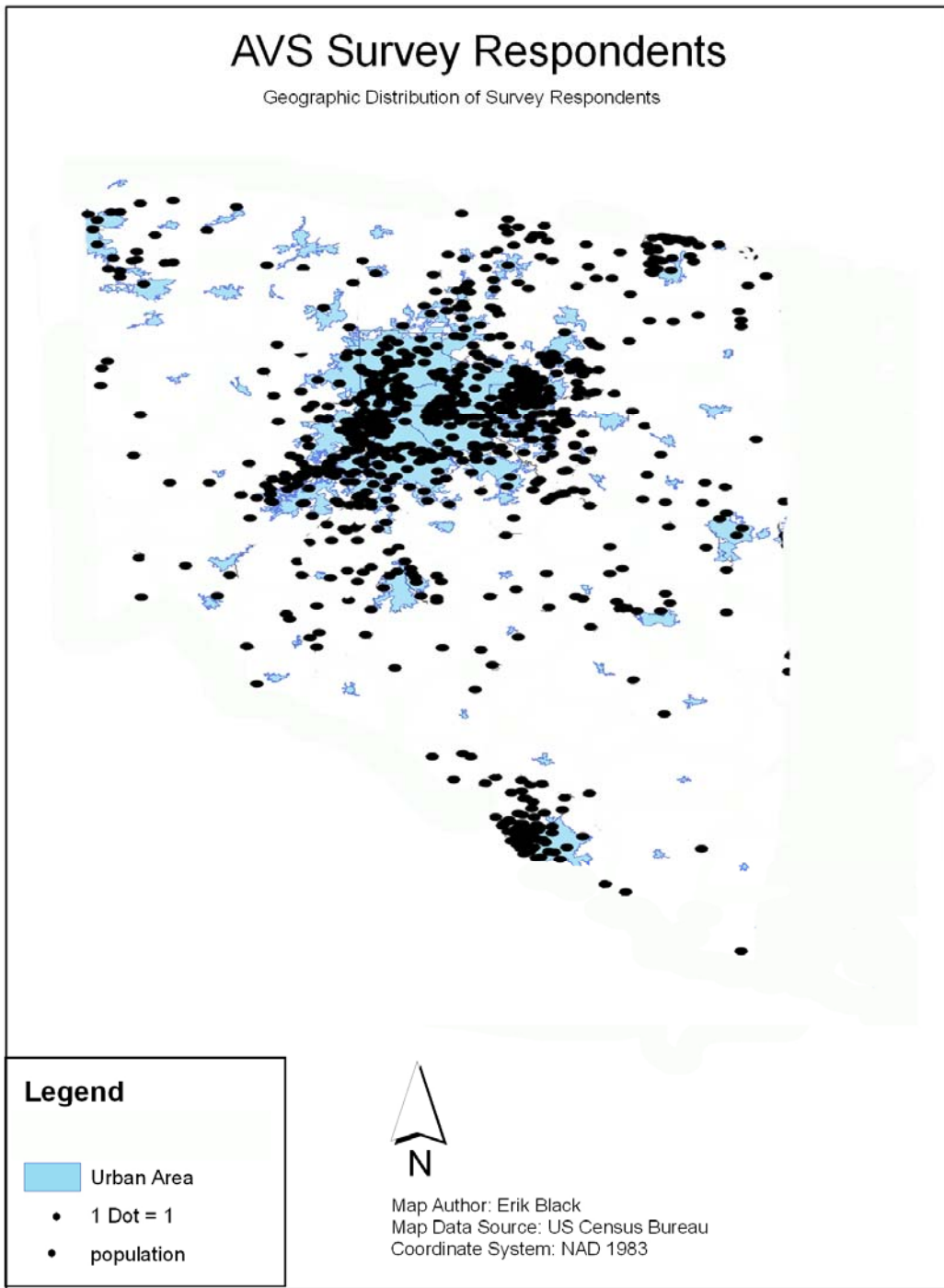


Figure 5-1. This map describes the geographic distribution of survey respondents

APPENDIX A
IRB AND INFORMED CONSENT



PO Box 112250
Gainesville, FL 32611-2250
352-392-0433 (Phone)
352-392-9234 (Fax)
irb2@ufl.edu

DATE: March 6, 2008

TO: Erik W. Blak
PO Box 117048 / G518E Norman Hall
Campus

FROM: Ira S. Fischler, PhD; Chair *ISF*
University of Florida
Institutional Review Board

SUBJECT: Approval of Protocol #2008-U-0034

TITLE: An Evaluation of Familial Involvement's Influence on Student Achievement in K-12 Virtual Schooling

SPONSOR: None

I am pleased to advise you that the University of Florida Institutional Review Board has recommended approval of this protocol. Based on its review, the UFIRB determined that this research presents no more than minimal risk to participants. Given your protocol, it is essential that you obtain signed documentation of informed consent from each participant over 18 years of age, and from the parent or legal guardian of each participant under 18 years of age. When it is feasible, you should obtain signatures from both parents. Enclosed is the dated, IRB-approved informed consent to be used when recruiting participants for the research.

Given your protocol, it is essential that you obtain signed documentation of informed consent from each participant over 18 years of age, and from the parent or legal guardian of each participant under 18 years of age.

If you wish to make any changes to this protocol, *including the need to increase the number of participants authorized*, you must disclose your plans before you implement them so that the Board can assess their impact on your protocol. In addition, you must report to the Board any unexpected complications that affect your participants.

If you have not completed this protocol by **March 3, 2009**, please telephone our office (392-0433), and we will discuss the renewal process with you. It is important that you keep your Department Chair informed about the status of this research protocol.

ISF:dl

APPENDIX B
VISUALIZING THE PARENTAL INTERACTION AND OUTLIER EFFECT ACROSS ALL
FOUR STUDY VARIABLES

Graphing the parental interaction across the four factors reveals an Asian/Asian-American male parental respondent (n=1) whose responses to the parent survey score far below the rest of the sample in each of the four parent factors (modeling, instruction, encouragement, and reinforcement). The following charts (2-5), present a visual description of the interactions. The outlier response is circled in red in charts 2-5.

Interaction 1

The first interaction, interaction 1 details a relationship between parental modeling and parent gender which is influenced by parent race/ethnicity (Chart 2). ANOVA results indicate a statistically significant interaction between average modeling and parent gender and race/ethnicity, $F(4, 688) = 3.858, p = .004$.

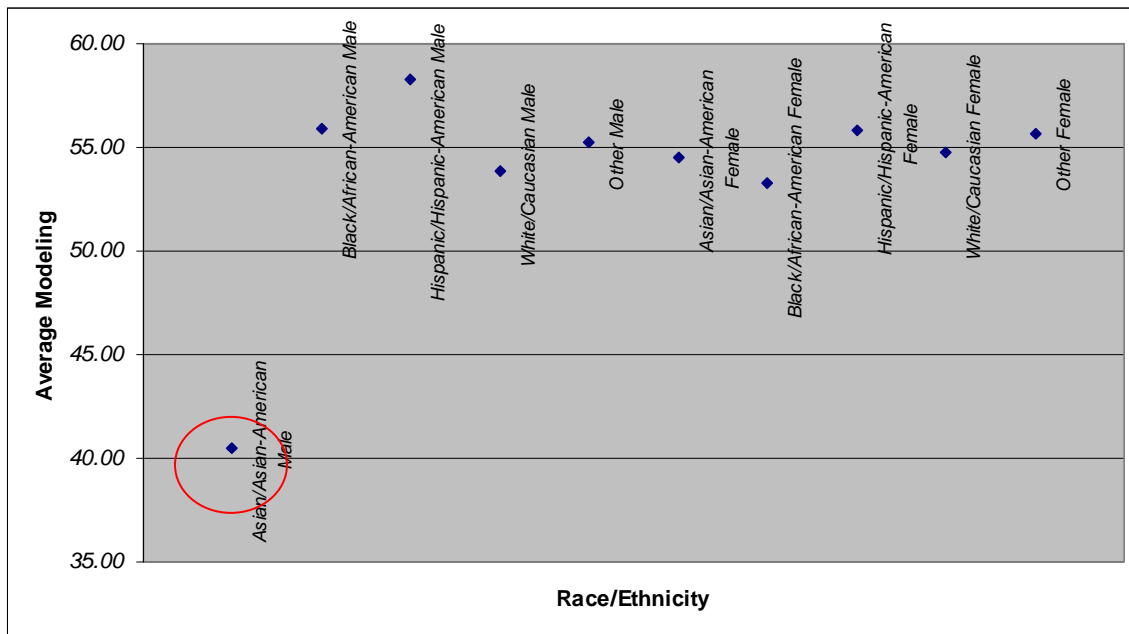


Figure B-1. The interaction between parental modeling and parent gender and parent race/ethnicity

Interaction 2

The second interaction, interaction 2, details a relationship between parental instruction and parent gender which is influenced by parent race/ethnicity (Chart 3). ANOVA results indicate a significant interaction between average parental instruction and parent gender and parent race/ethnicity, $F(4, 688) = 4.009, P < .01$.

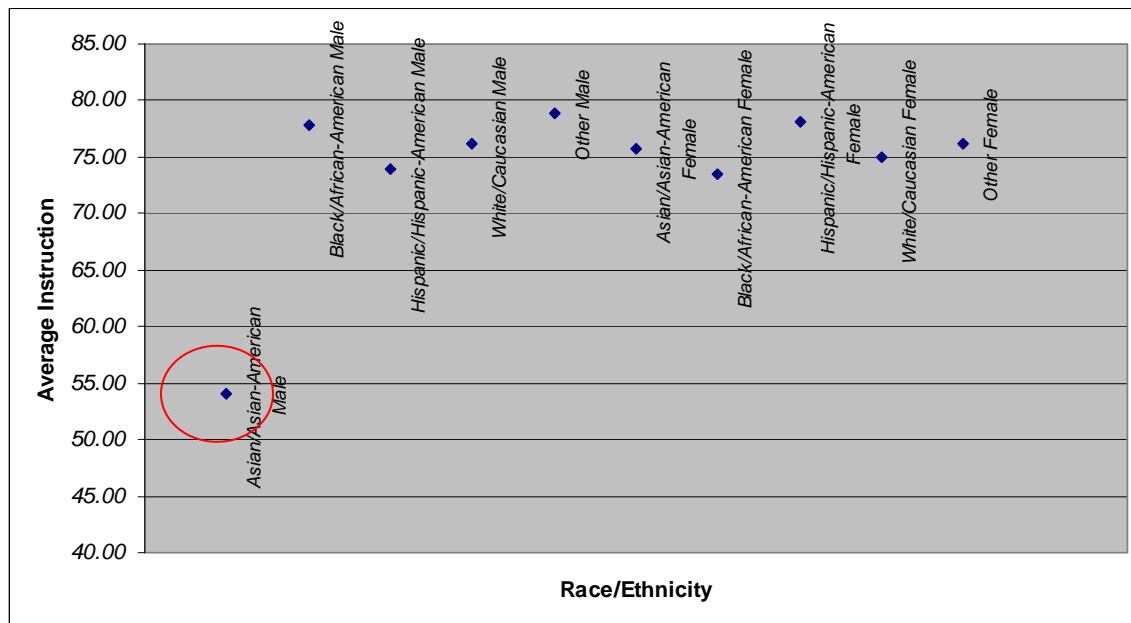


Figure B-2. The interaction between parental instruction and parent gender and parent race/ethnicity

Interaction 3

The third interaction, interaction 3, details the relationship between parental encouragement and parent gender which is influenced by parent race/ethnicity (Chart 4). ANOVA results indicate a statistically significant interaction between average parental encouragement and gender and race/ethnicity, $F(4, 688) = 2.507, P = .041$.

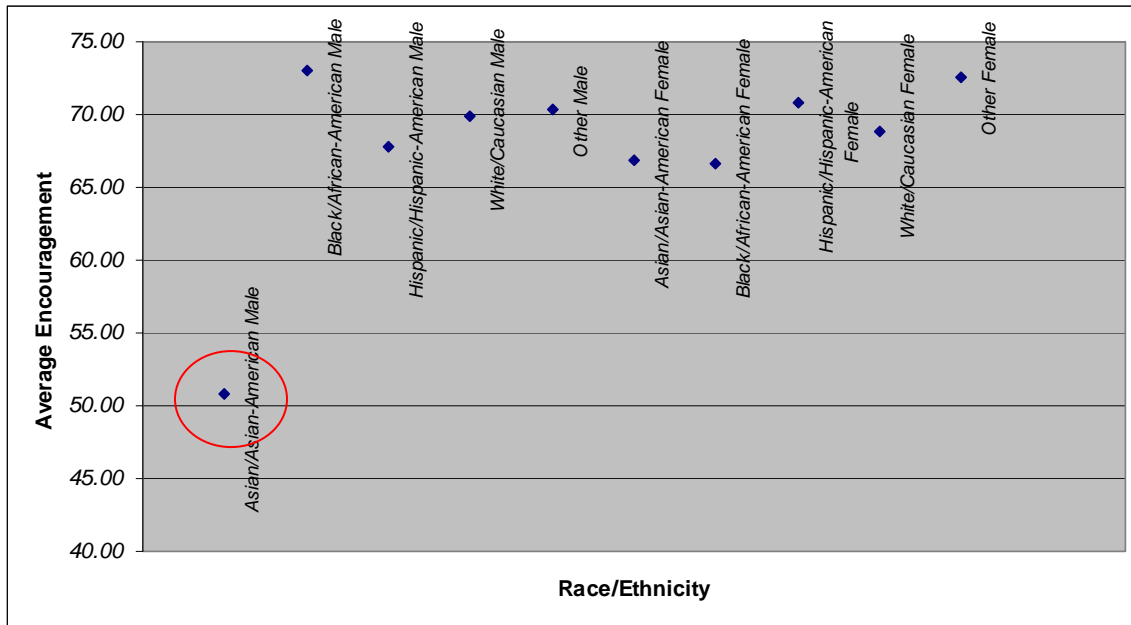


Figure B-3. The interaction between parental encouragement and parent gender and parent race/ethnicity

Interaction 4

The fourth interaction, interaction 4, details the relationship between parental reinforcement and parent gender is influenced by parent race/ethnicity (Chart 5). ANOVA results indicate a statistically significant interaction between average parental reinforcement and parent gender and parent race/ethnicity, $F(4, 688) = 3.361, P = .01$.

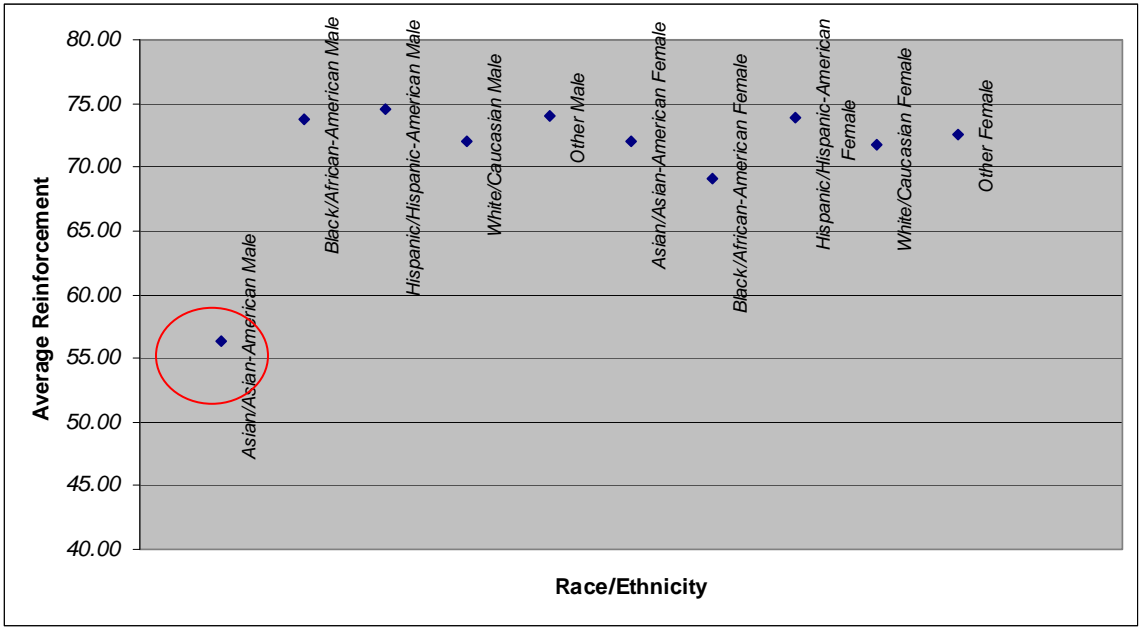


Figure B-4. The interaction between parental reinforcement and parent gender and parent race/ethnicity

APPENDIX C
VISUALIZING THE STUDENT INTERACTION AND OUTLIER EFFECT ACROSS ALL
FOUR STUDY VARIABLES

Graphing student interaction across the four student factors reveals a student (n=1) whose parent is a female with a doctoral degree whose survey responses to the student survey score far below the rest of the sample in across all four student factors (see charts 6-9). This individual's response is considered an outlier within the sample (circled in red in charts 6-9).

Interaction 1

The relationship between student modeling and parent education is influenced by parent gender (Chart 6). Analysis of the significant interaction between average parental reinforcement by gender and race/ethnicity, $F(5, 129) = 3.717, P = <.01$.

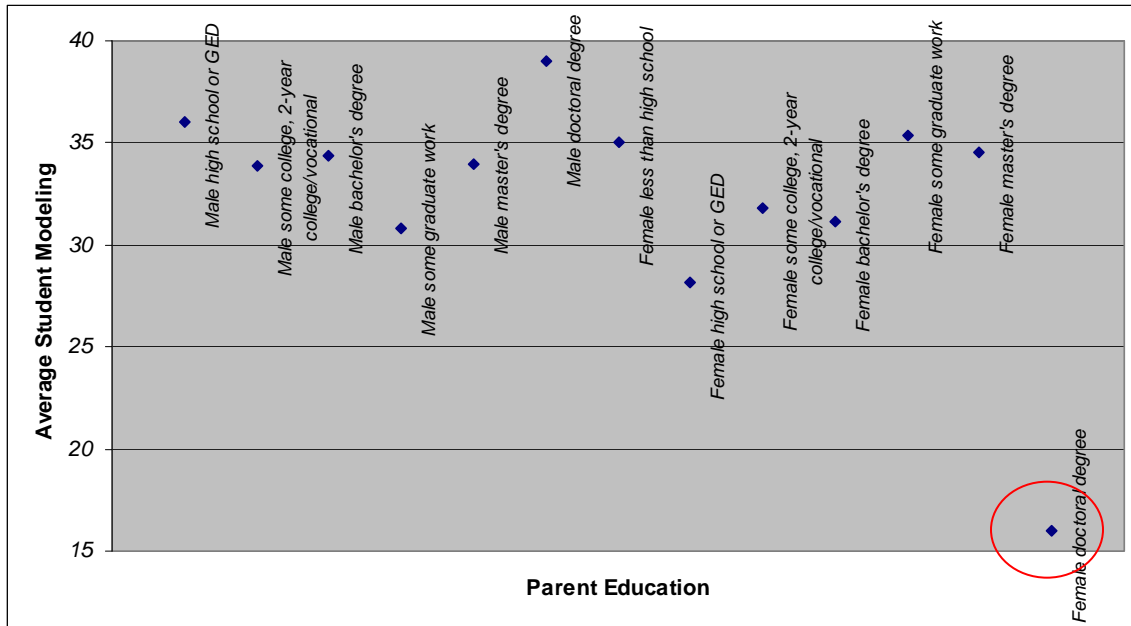


Figure C-1. The interaction between student modeling and parent education and parent gender

Interaction 2

The relationship between student instruction and parent education is influenced by parent gender (Chart 7). Analysis of the significant interaction between average parental reinforcement by gender and race/ethnicity, $F(5, 129) = 3.447, P = <.01$.

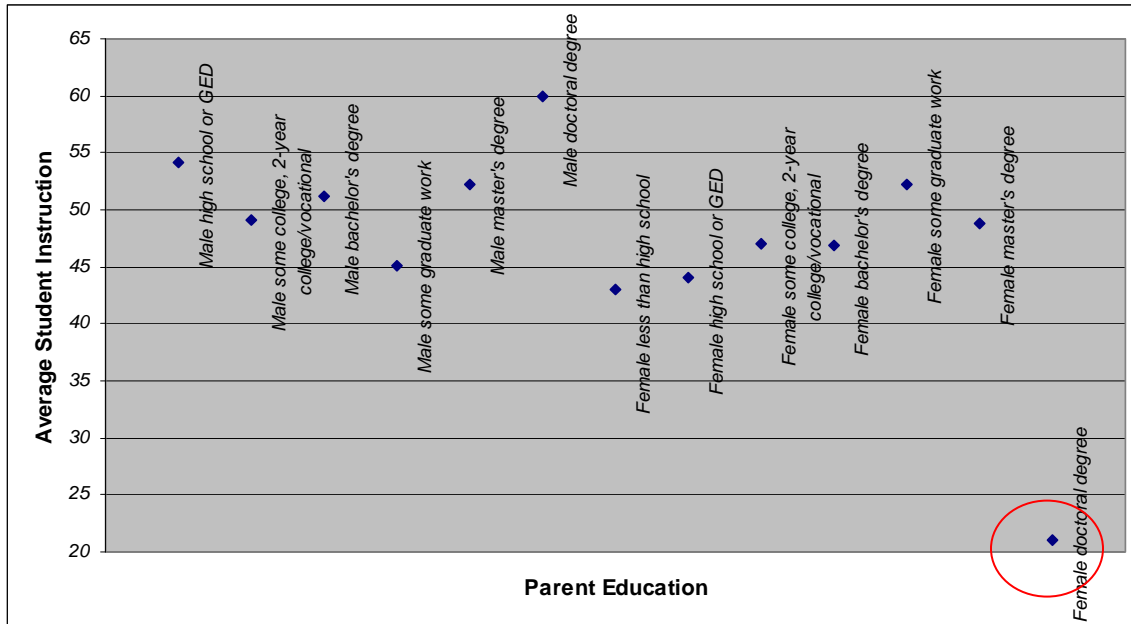


Figure C-2. The interaction between student modeling and parent education and parent gender

Interaction 3

The relationship between student encouragement and parent education is influenced by parent gender (Chart 8). Analysis of the significant interaction between average parental reinforcement by gender and race/ethnicity, $F(5, 129) = 3.058, P = .01$.

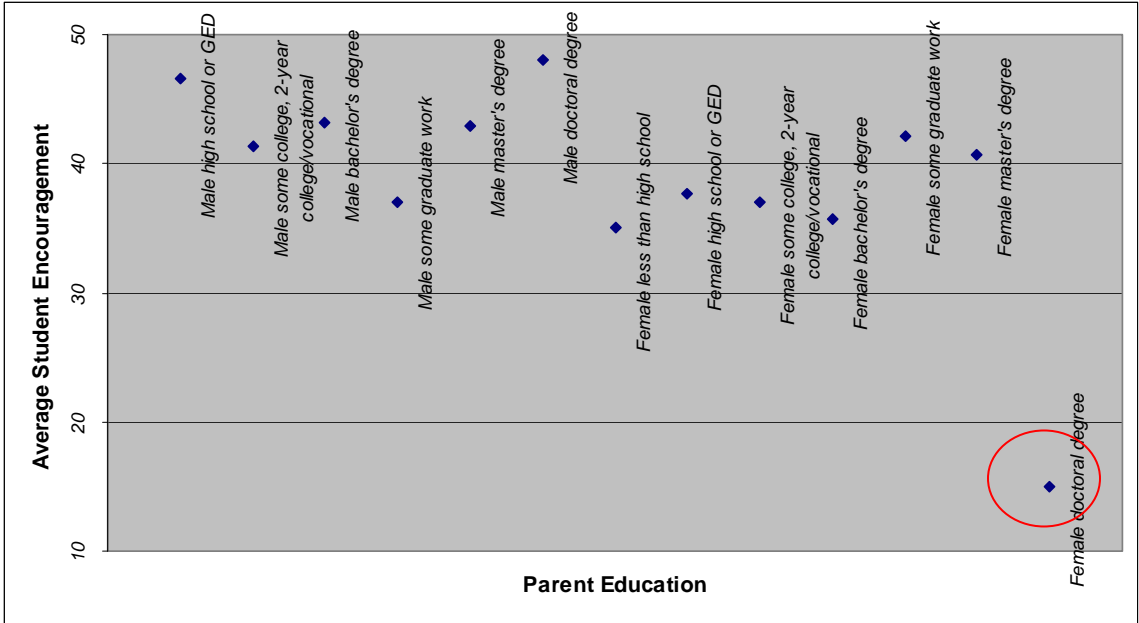


Figure C-3. The interaction between student encouragement and parent education and parent gender

Interaction 4

The relationship between student reinforcement and parent education is influenced by parent gender (Chart 9). Analysis of the significant interaction between average parental reinforcement by gender and race/ethnicity, $F(5, 129) = 3.380, P = <.01$.

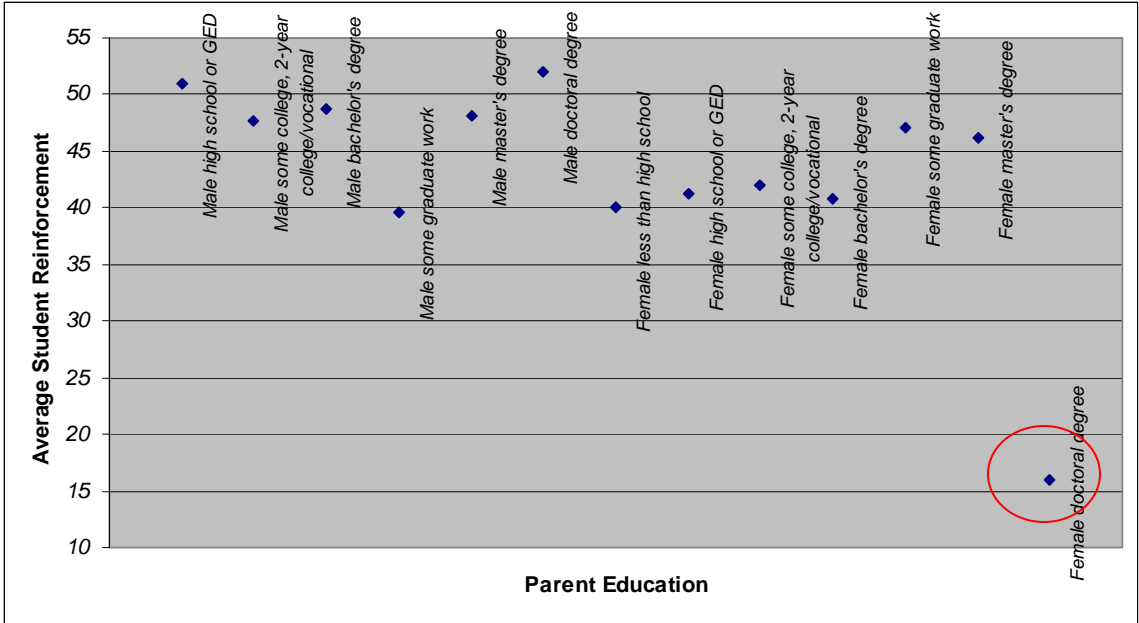


Figure C-4. The interaction between student reinforcement and parent education and parent gender

APPENDIX D
PARENT SURVEY

The parent survey consists of a demography section, a school valence section and four separate measurement variables: parental report of encouragement, parental report of modeling, parental report of reinforcement and parental report of instruction. Both the demography and valence section have unique formats and in the case of the valence section a unique Likert-style scale. For each of the four measurement variables, parents were instructed to respond to the following prompt:

“Parents and families do many different things when they help their children with schoolwork. We would like to know how true the following things are for you and your family when you help your child with schoolwork. Please think about the current school year as you read and respond to each item.”

Demography

- 1 Your Gender: Female Male
- 2 Please choose the job that best describes yours
(please choose only one):
 - Unemployed, retired, student, disabled
 - Labor, custodial, maintenance
 - Warehouse, factory worker, construction
 - Driver (taxi, truck, bus, delivery)
 - Food services, restaurant
 - Retail sales, clerical, customer service
 - Service technician (appliances, computers, cars)
 - Bookkeeping, accounting, related administrative
 - Singer/musician/writer/artist
 - Real Estate/Insurance Sales
 - Teacher, nurse
 - Professional, executive
 - Other: _____
- 3 On average, how many hours per week do you work?
 - 0-5
 - 6-20
 - 21-40

- ___ 41 or more
- 4 Your level of education
(please check highest level of education)
- ___ less than high school
- ___ high school or GED
- ___ some college, 2-year college or vocational
- ___ bachelor's degree
- ___ some graduate work
- ___ master's degree
- ___ doctoral degree
- 5 Please choose the job that best describes your spouse or partner's:
- ___ No spouse or partner
- ___ Unemployed, retired, student, disabled
- ___ Labor, custodial, maintenance
- ___ Warehouse, factory worker, construction
- ___ Driver (taxi, truck, bus, delivery)
- ___ Food services, restaurant
- ___ Skilled craftsman (plumber, electrician, etc)
- ___ Retail sales, clerical, customer service
- ___ Service technician (appliances, computers, cars)
- ___ Bookkeeping, accounting, related administrative
- ___ Singer/musician/writer/artist
- ___ Real Estate/Insurance Sales
- ___ Teacher, nurse
- ___ Professional, executive
- ___ Other: _____
- 6 Your spouse or partner's level of education
(please check highest level of education)
- ___ less than high school
- ___ high school or GED
- ___ some college, 2-year college or vocational
- ___ bachelor's degree
- ___ some graduate work
- ___ master's degree
- ___ doctoral degree
- 7 On average, how many hours per week does your spouse or partner work?
- ___ 0-5
- ___ 6-20
- ___ 21-40

- ___ 41 or more
- 8 Family income per year (check one):
- ___ less than \$5,000
- ___ \$5,001-\$10,000
- ___ \$10,001-\$20,000
- ___ \$20,001-\$30,000
- ___ \$30,001-\$40,000
- ___ \$40,001-\$50,000
- ___ \$50,001-\$60,000
- ___ \$60,001-\$70,000
- ___ \$70,001-\$80,000
- ___ \$80,001-\$90,000
- ___ \$90,001-\$100,000
- ___ \$100,001-\$150,000
- ___ over \$150,000
- 9 How many children (under the age of 19) live in your home?
- ___ 1
- ___ 2
- ___ 3
- ___ 4
- ___ 5
- ___ 6 or more
- 10 Your race/ethnicity:
- ___ Asian/Asian-American
- ___ Black/African-American
- ___ Hispanic/Hispanic-American
- ___ White/Caucasian
- ___ Other

School Valence

This scale assesses the parent's attraction to or general disposition toward schools, based on his or her prior personal experience with schools. This scale was adapted from Walker, Wilkins, Dallaire, Sandler, and Hoover-Dempsey (2005) and Hoover-Dempsey and Sandler (2005); the scale was administered to a sample of 358 parents of students in public school grades 4-6 with an alpha reliability of .84 (Walker et al., 2005; Hoover-Dempsey & Sandler, 2005).

The valence questions employ a 6-point Likert-style response format in which parents are asked to rate their experience regarding selected elements of schooling. Each of the elements is on a continuum; one end is anchored by negative experience, the other by positive experience (e.g., My school: 1 = disliked, 6 = liked).

Participants were asked to respond to the following prompt:

“People have different feelings about school. Please mark the number on each line below that best describes your feeling about your school experiences when you were a student.”

The following items constitute the valence section:

- | | | | | | | | | |
|-----------------------------|-------------|---|---|---|---|---|---|----------------|
| 1 My school: | disliked | 1 | 2 | 3 | 4 | 5 | 6 | liked |
| 2 My teachers: | were mean | 1 | 2 | 3 | 4 | 5 | 6 | were nice |
| 3 My teachers: | ignored me | 1 | 2 | 3 | 4 | 5 | 6 | cared about me |
| 4 My school
experience: | bad | 1 | 2 | 3 | 4 | 5 | 6 | good |
| 5 I felt like: | an outsider | 1 | 2 | 3 | 4 | 5 | 6 | I belonged |
| 6 My overall
experience: | failure | 1 | 2 | 3 | 4 | 5 | 6 | success |

Variable A - Parental Report of Encouragement

This scale assesses parents' self-reports of behaviors during involvement focused on encouraging the child in his or her schoolwork and learning. Adapted from Martinez-Pons (1996) by Hoover-Dempsey and Sandler (2005); the scale was administered to a sample of 358 parents of public school students in grades 4-6 with an alpha reliability of .92 (Hoover-Dempsey & Sandler, 2005).

We encourage this child ...

1. ... when he or she doesn't feel like doing schoolwork.
2. ... when he or she has trouble organizing schoolwork.
3. ... to try new ways to do schoolwork when he or she is having a hard time.
4. ... to be aware of how he or she is doing with schoolwork.
5. ... when he or she has trouble doing schoolwork.
6. ... to look for more information about school subjects.
7. ... to develop an interest in schoolwork.
8. ... to believe that he/she can do well in school.
9. ... to stick with problems until he/she solves it.
10. ... to believe that he/she can learn new things.
11. ... to ask other people for help when a problem is hard to solve.
12. ... to explain what he/she thinks to the teacher.
13. ... to follow the teacher's directions.

Variable B - Parental Report of Modeling

This scale assesses parents' self-reports of modeling strategies for solving problems, self-regulating, and learning. The scale was adapted from Martinez-Pons (1996) by Hoover-Dempsey and Sandler (2005). The scale was administered to a sample of 358 parents of public school students in grades 4-6 with an alpha reliability of .94 (Hoover-Dempsey & Sandler, 2005).

We show this child that we ...

1. ... like to learn new things.
2. ... know how to solve problems.
3. ... enjoy figuring things out.
4. ... do not give up when things get hard.
5. ... ask others for help when a problem is hard to solve.
6. ... can explain what we think to others.
7. ... can learn new things.
8. ... want to learn as much as possible.
9. ... like to solve problems.
10. ... try different ways to solve a problem when things get hard.

Variable C - Parental Report of Reinforcement

This scale assesses parent self-reports of parental reinforcement behaviors with the child. The scale was adapted from Martinez-Pons (1996) by Hoover-Dempsey and Sandler (2005) and was administered to a sample of 358 parents of public school students in grades 4-6. The scale has an alpha reliability of .96, as reported in Hoover-Dempsey and Sandler (2005).

We show this child we like it when he or she ...

1. ... wants to learn new things.
2. ... tries to learn as much as possible.
3. ... has a good attitude about doing his or her homework.
4. ... keeps working on homework even when he or she doesn't feel like it.
5. ... asks the teacher for help.
6. ... explains what he or she thinks to the teacher.
7. ... explains to us what he or she thinks about school.
8. ... works hard on homework.
9. ... understands how to solve problems.
10. ... sticks with a problem until he or she solves it.
11. ... organizes his or her schoolwork.
12. ... checks his or her work.
13. ... finds new ways to do schoolwork when he or she gets stuck.

Variable D - Parental Report of Instruction

This scale assesses parent self-reports of instructional behaviors with children during the course of involvement activities. The scale was adapted from Martinez-Pons (1996) by Hoover-Dempsey and Sandler (2005) and was used with a sample of 358 parents of public school students in grades 4-6. The scale has an alpha reliability of .92, as reported in Hoover-Dempsey and Sandler (2005).

We teach this child ...

1. ... to go at his or her own pace while doing schoolwork.
2. ... to take a break from his or her work when he or she gets frustrated.
3. ... how to check homework as he or she goes along.
4. ... how to get along with others in his or her class.

5. ... to follow the teacher's directions.
6. ... how to make his or her homework fun.
7. ... how to find out more about the things that interest him or her.
8. ... to try the problems that help him or her learn the most.
9. ... to have a good attitude about his or her homework.
10. ... to keep trying when he or she gets stuck.
11. ... to stick with his or her homework until he or she finishes it.
12. ... to work hard.
13. ... to communicate with the teacher when he or she has questions.
14. ... to ask questions when he or she doesn't understand something.
15. ... to make sure he or she understands one part before going onto the next.

APPENDIX E STUDENT SURVEY

This survey consists of four separate measurement variables: student report of parent's use of encouragement, student report of parent's use of modeling, student report of parent's use of reinforcement, and student report of parent's use of instruction. For each of the measurement variables, students were asked to respond to the following prompt:

“Dear Student, Families do many different things when they help children with school. Please think about how your family helps you with school and fill in the circle that matches what is most true for them. Thank you!”

The assessment employs a four-point Likert-type scale: 1 = not true, 2 = a little true, 3 = pretty true, 4 = very true.

Variable A - Student Report of Parent's Use of Encouragement

This scale assesses the extent to which a student perceives that his or her parent (or other family member identified by the student) encourages student behaviors, interests, and beliefs conducive to achievement during a representative parental involvement activity, monitoring or helping the student with homework. The scale was adapted from Martinez-Pons (1996) by Hoover-Dempsey and Sandler (2005). The scale was administered to a sample of 358 public school students in grades 4-6 with an alpha reliability of .87 (Hoover-Dempsey & Sandler, 2005).

“The person in my family who usually helps me with my homework encourages me...”

1. ...when I don't feel like doing my schoolwork.
2. ...when I have trouble organizing my schoolwork.
3. ...to be aware of how I'm doing with my schoolwork.
4. ...to try new ways to do schoolwork when I'm having a hard time.
5. ...when I have trouble doing my schoolwork.

6. ...to look for more information about school subjects.
7. ...to develop an interest in schoolwork.
8. ...to believe that I can do well in school.
9. ...to believe that I can learn new things.
10. ...to ask the teacher for help when a problem is hard to solve.
...to follow the teacher's directions.
12. ...to explain what I think to the teacher

Variable B - Student Report of Parent's Use of Modeling

This scale assesses the extent to which a student perceives that his or her parent (or other family member identified by the student) encourages student behaviors, interests, and beliefs conducive to achievement during a representative parental involvement activity, monitoring or helping the student with homework. The scale was adapted from Martinez-Pons (1996) and reported in Hoover-Dempsey and Sandler (2005). It includes items in the Parental Report of Modeling Scale, altered as appropriate for student perspective and response. The scale achieved an alpha reliability of .75 as administered to a sample of 358 public school students in grades 4-6 (Hoover-Dempsey & Sandler, 2005).

“The person in my family who usually helps me with my homework...”

1. ... likes to learn new things.
2. ...wants to learn as much as possible.
3. ...likes to solve problems.
4. ...enjoys figuring things out.
5. ...knows how to solve problems.
6. ...tries a different way if he or she has trouble solving a problem.
7. ...doesn't give up when things get hard.
8. ...can learn new things.
9. ...asks other people for help when a problem is hard to solve.
10. ...can explain what he or she thinks to other people.

Variable C - Student Report of Parent's Use of Reinforcement

This scale assesses the extent to which a student perceives that his or her parent (or other family member identified by the student) reinforces student behaviors, interests, and beliefs conducive to achievement during a representative parental involvement activity, monitoring or helping the student with homework. The scale was adapted from Martinez-Pons (1996) and reported in Hoover-Dempsey and Sandler (2005). It includes items in the Parental Report of Reinforcement Scale, altered as appropriate for student perspective and response. The scale achieved an alpha reliability of .87 when administered to a sample of 358 public school students in grades 4-6 (Hoover-Dempsey & Sandler, 2005).

“The person in my family who usually helps me with my homework shows me that he or she likes it when I...”

1. ...try to learn as much as possible.
2. ...have a good attitude about doing my homework.
3. ...want to learn new things.
4. ...check my work.
5. ...understand how to solve problems.
6. ...organize my schoolwork.
7. ...find new ways to do my work when I get stuck.
8. ...stick with a problem until it gets solved.
9. ...work hard on my homework.
10. ...keep working on my homework even when I don't feel like it.
11. ...ask the teacher for help.
12. ...explain what I think to the teacher.
13. ...explain what I think about school to him or her.

Variable D - Student Report of Parent's Use of Instruction

This scale assesses the extent to which a student perceives that his or her parent (or other family member identified by the student) instructs or teaches the student during a representative parental involvement activity, monitoring or helping the student with homework. The scale was adapted from Martinez-Pons (1996) and reported in Hoover-Dempsey and Sandler (2005). It includes items in the Parental Report of Instruction Scale, altered as appropriate for student perspective and response. The scale achieved an alpha reliability of .86 when administered to a sample of 358 public school students in grades 4-6 (Hoover-Dempsey & Sandler, 2005).

“The person in my family who usually helps me with my homework teaches me...”

1. ... ways to make my homework fun.
2. ... how to find out more about things that interest me.
3. ... to try the problems that help me learn the most.
4. ... to have a good attitude about my homework.
5. ... to make sure I understand one part before I go on to the next.
6. ... to take a break from my work when I get frustrated.
7. ... how to check my homework as I go along.
8. ... to go at my own pace while doing my homework.
9. ... to keep trying when I get stuck.
10. ... to stick with my homework until I get it all done.
11. ... to work hard.
12. ... to ask questions when I don't understand something.
13. ... how to get along with others in my class.
14. ... to follow the teacher's directions.
15. ... to communicate with the teacher when I have questions.

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BIOGRAPHICAL SKETCH

Erik Wade Black was born in 1975 in Kansas City, Missouri. The younger of two children, he grew up in Northern Virginia, attending W.T. Woodson High School in Fairfax City, VA. Erik graduated from Virginia Tech's Pamplin School of Business in 1997 with a BS in Marketing Management. He subsequently spent several years in sales and sales leadership positions with different technology and telecommunications companies in both Dallas, Texas and the Washington, D.C. area.

Erik earned an MA from The College of New Jersey in May 2005 where he specialized in career counseling and collegiate student services. In August of 2005, Erik enrolled at the University of Florida's School of Teaching and Learning as a doctoral fellow in the educational technology program.

During his tenure as a doctoral fellow, Erik has focused on research in the learning sciences. His investigative initiatives have included studies in online learning, quantitative methods and computational social science applications and identity in immersive online and social networking environments.

Erik is married to Dr. Nicole M. Paradise Black, an assistant professor of pediatrics and a pediatric hospitalist currently employed by the University of Florida's College of Medicine. They are the proud parents of two children: a son, Brennan, age 2; and a daughter, Ryan, age 1.