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REAL PARENTING IN A VIRTUAL WORLD: ROLES OF PARENTS IN ONLINE MATHEMATICS COURSES

by

KARLA GOLDHAHN CWETNA

Under the Direction of Dr. Iman Chahine

ABSTRACT

Enrollment in K-12 online courses continues to rise substantially each year (Evergreen Education Group, 2015). As the number of students taking courses online increases, the number of parents parenting in online courses also increases. This qualitative exploratory case study, bounded by the online program that was studied, was performed to better understand parents' perceptions of their roles in online high school mathematics courses. Eighty-seven parents participated in an online questionnaire which elicited both quantitative and qualitative responses. Guided by the major tenets of symbolic interactionism theoretical framework, these responses were combined with data from six interviews to investigate why parents chose to enroll their children in online mathematics courses, their expectations pertaining to the online mathematics course, and their perceived roles and responsibilities in the online mathematics course.

Through a detailed process of analyzing the questionnaire and interview data, nine themes emerged: (a) participant parents enrolled their children in online mathematics courses to

remove their child from a negative social environment and to avoid distractions in the traditional setting; (b) participant parents want their children to have the flexibility to work ahead of their peers; (c) the school should provide quality curriculum and resources for teachers, students, and parents; (d) teachers should identify and address when students need help; (e) teachers should be available and approachable; (f) students should put forth their best effort; (g) students should ask for help when they experience difficulty understanding a new concept; (h) participant parents monitor to make sure their children are completing assignments and asking for help; and (i) participant parents help their children by re-teaching mathematics concepts or encouraging the child to seek help from others.

This study has theoretical and practical significance by adding to literature investigating parental roles in mathematics education and providing insight on the nature of parental involvement in an online high school mathematics program. Consistent with relevant literature (Currie-Rubin & Smith, 2014; Curtis, 2013; Thurber, 2013), results of this study call upon educators to invest in efforts that enhance understanding of parents' perspectives in an effort to strengthen parental involvement in online mathematics courses.

INDEX WORDS: Mathematics, Online learning, Online mathematics, K-12 online learning, Virtual learning, Parental involvement, Parental engagement, Parental roles, Interactions, Teacher responsibilities, Student responsibilities, Success, Perceptions of success, Flexibility

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KARLA GOLDHAHN CWETNA

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DEDICATION

To mom and dad, thank you for always encouraging me with your unwavering love and support. I appreciate how hard you have always worked so that I could pursue my ambitions. I love you.

To my best friend and husband, Tom, when I thought I had reached my limits, you motivated me with reassurance that I could keep going. Thank you for being my rock. Your love and patience have kept me sane. I could not have achieved this milestone without you.

To my precious son, William, you became my motivation for finishing this degree. I never knew how much I could love until I met you. May your curiousity of the world spark a lifetime of learning and exploration.

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Thank you to my committee members—Dr. Mandy Swygart-Hobaugh, Dr. Jonathan Cohen, and Dr. Joseph Feinberg—for all you have done to help me complete this dissertation.

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CHAPTER 1

Introduction

Jason Jones considers himself a hands-on father. He spends time with his children playing games, attends sporting events, and regularly emphasizes the importance of education. He is notorious for asking his daughters what they learned each day and insisting on more information than a shrug. His middle child, Megan, is having difficulty making friends and comes home from school crying every day. Her social anxiety makes it difficult to focus in class and her grades have fallen from A's and B's, to C's and D's. She begs to enroll in an online program offered by her school district. Mr. Jones talks to other parents of students in the online program about the demands of the program and finally agrees to let Megan enroll. Mr. Jones and his wife both work full-time, so Megan will be home alone as she completes her studies each day. They rearranged their dining room to resemble an office, purchased Megan the best computer they can afford, and even increased their home internet speed. With no formal orientation for parents, Megan begins her online courses. Whether they realize it or not, Mr. and Mrs. Jones have just entered into a new role, with new demands: parenting in online courses.

In the 2015 *Keeping Pace with K-12 Digital Learning* report, the Evergreen Education Group determined that during the 2014-15 school year there were about 4.5 million online course enrollments in the United States. The demand for virtual schooling continues to increase, at a rate of approximately 30% per year (Deubel, 2008, in Palloff & Pratt, 2011). To meet this demand, states, districts, and schools are introducing online K-12 programs at rapid rates. By 2014, 30 U.S. states were operating full-time virtual schools (Watson, Pape, Murin, Gemin, & Vashaw, 2014). As the number of students taking online courses increases, the number of parents parenting in online courses also increases. Therefore, to improve academic achievement in online courses, it is critical to develop a better understanding of the role of parents in these online courses (Black, 2009).

The role of parents in virtual learning environments is a critical element to a student's success (Black, 2009; Currie-Rubin & Smith, 2014; Curtis, 2013). In fact, Waters, Menchaca, and Borup (2014) acknowledged that some research has indicated that "parents have greater responsibilities online than they do in the face-face courses" (p. 307). Parents must occupy the space normally held by the teacher in a traditional classroom (Black, 2009). Teachers expect parents in online courses to monitor, mentor, and motivate their children in their academic studies (Curtis & Werth, 2015). Though parents have a special role in online learning, the literature related to K-12 online learning is all but void of this topic (Curtis & Werth, 2015).

Problem Statement

Research should not focus on "if K-12 online and blended learning works, but when, how, and under what circumstances" (Ferdig & Kennedy, 2014, XII). There is accordance in the research community that parents have a positive impact on student achievement in traditional learning environments (Edwards, 2004; Fantuzzo, Gadsden, Li, Sproul, McDermott, Hightower, & Minney, 2013; Fehrmann, Keith, & Reimers, 2001; Henderson & Mapp, 2003; Hoover-Dempsey, Bassler, & Brassies, 1992; Jackson, 2010; Liu, Black, Algina, Cavanaugh, & Dawson, 2010; Orozco, 2008; Thurber, 2013). Unfortunately, there is a lack of research on the impact of parents in virtual schooling (Black, Ferdig, & DiPetro, 2008; Black, 2009; Waters, Menchaca, & Borup, 2014).

Parents typically make an active choice to enroll their children in online education programs (Waters, Menchaca, & Borup, 2014). Unlike the traditional, public, brick-and-mortar school which they are zoned for, online school programs require a parent to seek out enrollment and participation. Parents choose to enroll their children in online programs for different reasons. Waters, Menchaca, and Borup (2014) indicate these reasons might include: credit recovery; taking courses which are not offered at their traditional school, such as Mandarin or a particular advanced placement course; negative incidents, such as bullying or health and safety; and the need for more flexible schedules.

Parents are also involved in online programs in different ways. Waters, Menchaca, and Borup (2014) suggest that "the level of amount of parental involvement in K-12 online schooling may be thought of along a continuum: The left side of the continuum represents little parental involvement while the right side reflects full involvement" (p. 309). Some parents might be very involved, maintaining frequent contact with the teachers of the courses, keeping track of required assignments and filtering feedback on assessments. Other parents might be completely hands-off, expecting their child to be self-motivated, organized, and willing and able to effectively communicate with their teachers as needed.

Different motivations for taking online courses combined with different levels of parental involvement leads to different experiences with online learning programs--different realities for different families. Such realities can be explored and lead to a better understanding of how families experience online learning. The result of that understanding can lead to improved relationships between teachers, administrators, parents, and students.

Parents of online students also perceive success differently (Curtis & Werth, 2015). Some parents might describe a successful student as one who creates his own daily plan and works independently (Curtis & Werth, 2015). Whereas others may emphasize grades or student accountability. This research study on the nature of parental roles in online secondary mathematics courses adds to the understanding of how parents perceive academic success and how they support their children in learning.

Purpose Statement and Research Questions

The purpose of the study was to examine the nature of parental involvement in high school online mathematics courses. Specifically, I explored the following questions:

1. What are the factors contributing to parents' choice of online mathematics programs over traditional, brick-and-mortar programs for their children?
2. What are parents' expectations of the program, teachers, and their own children?
3. How do parents define and describe their roles as their children are engaged in learning mathematics through online programs?

Definition of Terms

Asynchronous learning: Learning activities that can occur at different times and in different places. Examples: Recorded lectures, email, and homework.

Gifted: According to the school district's website, students qualify to participate in gifted services if he or she meets criteria one and two below, *or* three of the four requirements.

1. Mental ability: 96% or higher on a standardized mental ability test,
2. Achievement: 90% or higher on a reading or mathematics standardized achievement test,
3. Creativity: 90% or higher on a standardized creativity test,
4. Motivation: 90% or higher on a standardized motivational characteristics rating scale, or GPA of 3.5 of higher.

Individualized Education Plan (IEP): A plan or program that is required for any student receiving special education services. The plan is created by a special education team that includes a description of what kind of special education program the student will receive, the services that will be provided by the school district, and measurable annual goals and objectives (Kurth & Mastergeorge, 2010).

Online/virtual course: Refers to a course in which all requirements are facilitated online. The content, assessments, and feedback occur in an online format.

Parent: Any parent, caregiver, or guardian who is the primary support person for a student taking an online course (Waters, Menchaca, & Borup, 2014).

Parental involvement/engagement: Ways in which parents interact with their children, the content, and the school.

Synchronous learning: Learning activities that happen at a specific time. Examples: live lectures, instant messaging, and video conferencing.

504 plan: A 504 plan describes the accommodations, modifications, and supports needed by a student with a physical or mental impairment, in order to more fully access the curriculum.

Rationale

The dearth of literature related to parents in online learning environments supports the rationale for this study. Online programs for K-12 students continue to emerge at an exponential rate (Kennedy & Archambault, 2012). However, research about parents' relationship to K-12 online learning environments is virtually absent (Curtis & Werth, 2015). There is also a shortage of research describing why secondary students choose to enroll in online courses (Morabito, 2010). The findings of this study help fill that void.

Concerns for improving student success in secondary online learning courses provided the impetus of this research study. Despite the growing number of programs offering online courses, little evidence is reported on the role of parental involvement in the learning process (Waters, Menchaca, & Borup, 2014). Boulton (2008) stressed the importance of students having someone to support their learning and acknowledged that in the online setting this role falls mainly on the parents. A better understanding of this role, as it is perceived by parents, might help researchers, administrators, and teachers improve their efforts to provide parental support in online learning environment. In this research study, parents responded about their participation in their children's online mathematics course. Their responses were explored to gain a better understanding of parental involvement in online mathematics courses.

Significance of Study

This research study has theoretical and practical significance. In particular, this study adds to literature investigating parental roles in education by providing insight on the nature of parental involvement and engagement in online mathematics courses. Ferlazzo (2011) describes involvement as an act of "doing to," whereas engagement describes an act of "doing with." In this research study, the terms engagement and involvement are used interchangeably. Parental involvement and engagement in virtual learning environments are important elements of a student's success (Boulton, 2008; Black, 2009; Currie-Rubin & Smith, 2014; Curtis, 2013). This study is important for practitioners as they explore the role of parental involvement in advancing student learning. The results of this study could be used by administrators and teachers to better inform their efforts to engage parents in the online learning experience.

Furthermore, findings of this research study may inform administrators, course designers, teachers, and other parents by suggesting ways to improve course design to increase student success in mathematics. Another added value of the study is its potential to provide insight for parents to learn how other parents behave and react to situations during the online mathematics learning experience in order to improve their own experience.

Theoretical Framework

As the researcher in this study, I employed symbolic interactionism framework and was guided by its major tenets: self-talk, social interaction, and meaning making (Blumer, 1969). Symbolic interactionists believe that people act towards objects and events, both tangible and abstract, based on their own interpretation of them. These interpretations are created and altered through social interaction and self-talk, or thought (Blumer, 1969). The following sections provide background on the historical and epistemological development of symbolic interactionism. The rationale for using symbolic interactionism framework to explore parental involvement in online education will also be discussed.

Historical and Epistemological Development of Symbolic Interactionism

Symbolic interactionism was originally developed as a philosophy of how people understand the world. The foundation of this philosophy is that meaning is constructed through social interaction (Crotty, 1998). Symbolic interactionism was born of the thoughts of the philosopher and psychologist George Herbert Mead (1934). Mead's works spawned from the works of Max Weber, who also supported that meaning is not an ultimate truth, but rather a construction of the participants.

Symbolic interactionism developed from the epistemological standpoint of constructionism. Constructionism, as an epistemology, is the belief that there is no one objective truth waiting to be discovered (Crotty, 1998). Instead, according to Crotty (1998), "Truth, or meaning, comes into existence in and out of our engagement with the realities of our world" (p. 8). Each person has a unique perspective and engagement with the world and therefore different people may construct meaning differently, even of the same object (Blumer, 1969). Constructionists accept that there is a reality, "but argue that it cannot be measured directly, only perceived by people, each of whom views it through the lens of his or her prior experience, knowledge, and expectations" (Rubin & Rubin, 2012, p. 15). In other words, constructionists believe that meaning is sifted through people's prior experiences and biases which in turn affect how people build or construct their understanding of the external world (Rubin & Rubin, 2012).

Blumer's explanation of symbolic interactionism. Herbert Blumer, a student of Mead, actually coined the term symbolic interactionism. According to Blumer (1969), human experience is mediated by interpretation. Objects themselves do not possess meaning. Rather, meaning is bestowed on objects by people and their interpretation of the object. In this case, the word object refers to tangible items as well as events, people, and situations. Symbolic interactionism is the belief that meaning is a set of "creations that are formed in and through the defining activities of people as they interact" (Blumer, 1969, p. 5).

According to Blumer (1969), there are three premises of symbolic interactionism:

1. Humans act towards things on the basis of the meanings of these things.
2. Meaning is a product of society, or interacting with others.
3. The meanings people apply to their environment are altered through a process of internal interpretation.

No two people have had the exact same experiences. Therefore, many interpretations of the same event or object might exist. Proponents of symbolic interactionism argue that the goal of the researcher is to better understand how and why people define objects and experiences the way they do (Crotty, 1998).

Blumer (1996) argues that there are three categories of objects: physical, social, and abstract. From Blumer's viewpoint, it is important to note that an object can have different meanings for different people based on their interpretation or use of the object. Take a tablet for example. To illustrate, the tablet for a parent might hold the meaning of being a device meant to entertain a toddler while out to eat at a restaurant, such as to watch a favorite cartoon episode or trace letters and numbers using the latest educational app. To the older child, it might be viewed as a source of entertainment; used to play games, create and watch videos, or to engage in social media. To a student taking online courses, it is a way to access coursework, engage with other students, complete assignments, and check grades. For a school technology specialist, the tablet might be seen as a device that needs to be inventoried, programmed, and maintained. To the teacher, the tablet might represent new technologies to discover and incorporate into the classroom.

Though the teacher, parent, student, and school technology specialist may all live in the same community, the meanings they attribute to the tablet are all different. The tablet scenario illustrates Blumer's belief that "People may be living side by side yet be living in different worlds" (1969, p. 11). In fact, one person may even consume multiple roles and have different meanings for the same object when in different situations. For example, the teacher might also be a parent taking online courses in the evenings. For this person, the tablet represents various meanings at different times throughout the week.

Symbolic Interactionism and Virtual Learning Environments

Symbolic interactionism is a particularly appropriate approach for studying online learning environments because of the potential vast differences in experiences of participants. According to Bogdan and Biklen (2007), a key to symbolic interactionism theory is the notion that, "The meaning people give to their experience and their process of interpretation are essential and constitutive, not accidental or secondary to what they experience" (p. 27). Specifically related to online education, interaction is considered one of the major paradigms in research (Borup, Stevens, & Waters, 2015; Fletcher, Sigmund, & Wisher, 2007; Mallan, Ashford, & Singh, 2010; Wagner, 1994; Moore, 1989; McIsaac & Gunawardena, 1996). The modes of interaction, motivation behind interaction, and effects of interaction are topics worth exploring.

Through the lens of symbolic interactionism, we understand meaning to be a reaction to one's social experiences with an object, and that each person can have his or her own interpretation of that object (Blumer, 1969; Crotty, 1998). From that perspective, how do different understandings of technology affect the understanding and use of that technology, specifically in relation to education? For example, in a chat room in an online mathematics tutoring session, the teacher might view the chat room as an opportunity for students to ask content related questions to each other or to the instructor. Students might view the chat room as a way to socialize with other students or even as a way to speak up in class without actually having to talk. Parents might think of it as the only way for a student to ask a question during an online session and miss the fact that the student could utilize the microphone feature. All of these different interpretations inevitably affect the usefulness and overall impact of the chat room on the learning experience.

Each student and parent has a unique experience in online education. Students in online courses have the flexibility of time and location of their learning. Students are not required to log in at a certain time, or from a specific location. Students also have flexibility in how they interact with other students, the teacher(s), and the educational content materials. Each student's experience will therefore be unique. In this research study, symbolic interactionism afforded opportunities to listen to different experiences, reaching for a better understanding of how those experiences are described and defined. Using the triad of self-talk, meaning making, and social interaction, symbolic interactionism provided a useful approach to better understand how parents perceive their own experiences with their child's online mathematics course.

CHAPTER 2

Review of the Literature

According to Picciano and Seaman in The Sloan Consortium (2008), “approximately 1,030,000 K-12 students engaged in online courses in 2007-2008, representing a 47% increase from 2005-2006”. In the 2015 *Keeping Pace with K-12 Digital Learning* report, the Evergreen Education Group reported that during the 2014-15 school year, over 2.2 million K-12 students took a course online. Over the course of seven years, the number of students taking an online course more than doubled. As the number of online K-12 programs continues to increase at astounding rates, how are researchers addressing the changing demands of the parents of children in online courses?

The purpose of this chapter is to review current research on the role of parenting in students’ mathematics learning in online programs. Figure 1 illustrates how the literature review is organized. To provide a foundation of understanding of related topics, this chapter is organized into six categories: parental roles in traditional learning environments, parental roles in traditional mathematics learning environments, research of education in online environments, roles of parents in online learning environments, research of mathematics education in online environments, and roles of parents in online mathematics education programs.

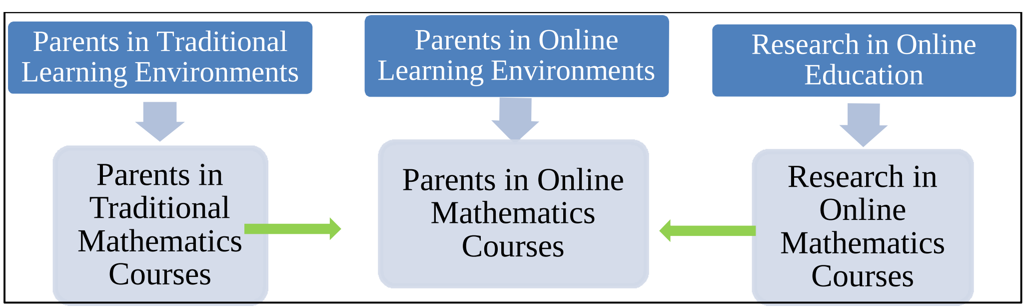

Figure 1. This figure illustrates the organization and flow of the literature review.

Parental Roles in Traditional Learning Environments

It has long been understood that parental participation in traditional learning environments has a positive impact on student achievement (Borup, Stevens, & Waters, 2015; Edwards, 2004; Fantuzzo, Gadsden, Li, Sproul, McDermott, Hightower, & Minney, 2013; Fehrmann, Keith, & Reimers, 2001; Henderson & Mapp, 2003; Hoover-Dempsey, Bassler, & Brassies, 1992; Jackson, 2010; Liu, Black, Algina, Cavanaugh, & Dawson, 2010; Orozco, 2008; Thurber, 2013). However, there is a lack of agreement on which specific parenting strategies have the greatest impact on student achievement (Thurber, 2013).

Parenting styles. Dornbusch, Ritter, Leiderman, Roberts, and Fraleigh (1987) employed large-scale questionnaires to study the effects of parenting styles on academic performance in traditional learning environments. They used quantitative statistics to measure correlations between characteristics. They also tested across gender and ethnic groups. Dornbusch et al. (1987) identified three parenting styles: authoritarian, authoritative, and permissive submissive. The researchers studied the effects of the different parenting styles on children’s academic performance. The results of their research revealed a negative association between authoritarian and permissive parenting styles with students’ grades. They found that authoritative parenting styles were positively associated with students’ grades (Dornbusch et al., 1987). Table 1 provides a brief description of each parenting style along with the research findings.

Table 1

Effects of Parenting Style on Academic Performance

Parenting Style	Description	Research Findings
Authoritarian	Absolute set of standards by which children are expected to behave. Emphasis on respect and authority. No verbal give-and-take with the child.	Children exhibited low levels of independence and social responsibility.
Authoritative	Clear expectations of mature behavior from children. Rules and standards are enforced using commands and sanctions when necessary. Emphasis on fostering the child's independence and individuality. Support open communication, encouraging verbal give-and-take.	Children are more independent and socially responsible. The children demonstrated a higher level of social and cognitive competence.
Permissive submissive	Tolerant and accepting of the impulsive behaviors. Fewer demands for mature behavior and rarely dole out punishment.	Children lacked maturity, impulse control, social responsibility and independence. They also exhibited lower levels of social and cognitive competence.

Note. This table summarizes the research findings of Dornbusch et al. (1987) on the effects of three parenting styles on academic performance.

Ihmeideh and Shawareb (2014) also examined parenting styles, though applied to the parents' perspectives on their children's use of the internet. Ihmeideh and Shawareb (2014) analyzed the questionnaire responses of 570 Jordanian parents of K-2 students. The researchers found that an authoritative parenting style is a statistically significant predictor of internet use by young children. Ihmeideh and Shawareb (2014) suggest that this is a reflection of the parents' interest in their children's learning and recognition that the internet can have a positive effect on learning.

Parental involvement. Epstein et al. (2002) identified a model of parental involvement that has provided the framework for many other researchers. Figure 2 illustrates the six types of parental involvement described in Epstein's model. Ferlazzo (2011) describes involvement as an act of "doing to," whereas engagement describes an act of "doing with". Although Epstein mostly uses the word involvement, much of the descriptions are of a partnership between parents and the school, more a dialogue of doing *with* than doing *to*.

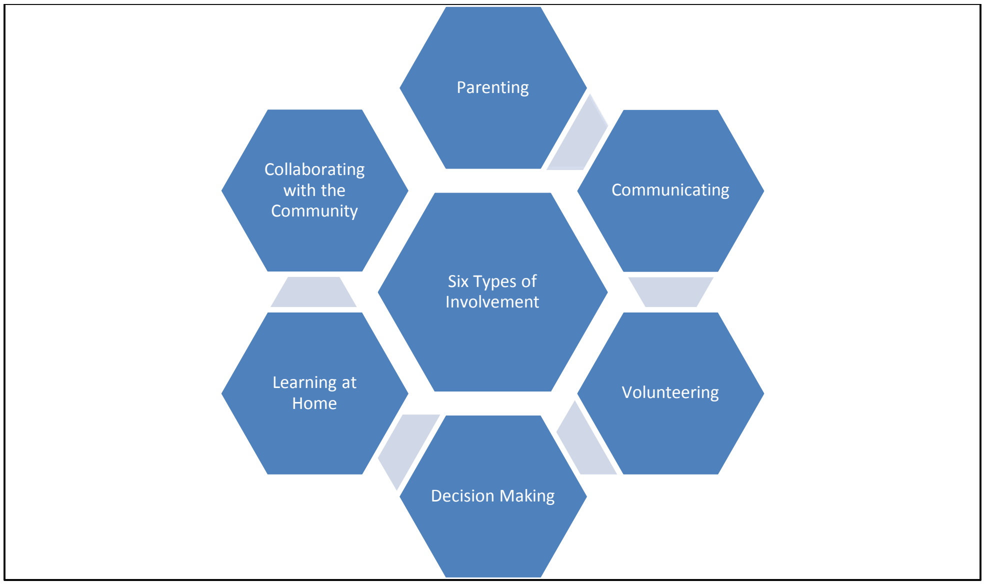

Figure 2. The researcher's depiction of the major tenets of Epstein's framework of parental involvement.

The first way that parents can support children as students is by increasing their involvement at home (Bicknell, 2014; Thurber, 2013). This does not necessarily mean that parents create formal learning opportunities, but rather that parents communicate a belief that education is valuable (Fantuzzo et al., 2013; Kikas, Tulviste, & Peets, 2014; Orozco, 2008; Patel & Stevens, 2010; Wiseman, 2010).

The second type of involvement includes communication between the school and home, and vice versa. It is important for parents to know how their children are performing both academically and behaviorally. However, it is equally important for parents to gain a better understanding of their child's daily experiences at the school to be able to place those behaviors within context (Thurber, 2013).

Other ways that parents can involve themselves in their children's education is through volunteering and getting involved in decision making at the school level (Kikas et al., 2014; Thurber, 2013). Volunteering, the third category of parental involvement in Epstein's model, gives the parents an opportunity to gain further insight into the culture of the school and the daily experiences of their children. The fourth category of parental involvement is decision making. Getting involved in school governance and decision making sends a message to the children that the parents are invested in their children's school. Thurber (2013) claims that "When parents come to school on a regular basis, it impresses on the child that the home and school are connected in a concrete way" (p. 21).

The fifth category of parental involvement includes learning which takes place at home. These types of activities range from assisting with homework to doing activities together that provide opportunities for children to learn new skills or apply the skills they have learned at school. Examples of such activities include baking a cake, repairing a bicycle, and building a bird house.

The sixth type of parental involvement is collaborating with the community. Thurber (2013) describes how parents who work in the community can help schools build relationships with businesses and organizations to create a more diverse network of stakeholders. Collaborating with the community also includes families interacting with other families through community activities (Epstein et al., 2002).

Framed by Epstein's model of parental involvement, Thurber (2013) conducted quantitative research to investigate the impact of parental involvement in activities at home on students' reading and mathematics achievement. Thurber collected data from two schools, one as the experimental group and the other as the control group. Both schools participated in a character education program. However, only the experimental group had specific parent activity components. At the end of each month, parents at the experimental school voluntarily completed a survey indicating how many activities they engaged in during the month. Thurber compared the responses to the students' scores on reading and mathematics assessments at each school.

Thurber (2013) concluded that there was no statistically significant difference in the area of reading or mathematics achievement between the two schools.

Another study influenced by Epstein's framework is Jackson's (2010) research on parental involvement from the perspective of parents. Jackson interviewed 15 parents who had been identified by school officials as typically not involved in their child's academics. The purpose of Jackson's research was to describe how parents support their children's education and how they understand their own relationships with educators to support their children's education.

One of the main conclusions of Jackson's (2010) research is that parents' definition of involvement is broader than Epstein's model and includes involvement in every aspect of a child's life. Jackson's findings point to ways in which parents might be involved in their child's academics that may not be understood by teachers and administrators. Jackson (2010) highlights three emergent themes related to involvement from the parent's perspective: responsibility, nurture, and expectations. Henderson and Mapp (2003) discuss research on parental involvement for middle and high school students drawn mostly from survey research. Their research focused on traditional learning environments in general. They reference a few cases where mathematics, usually alongside reading, was the focus of the studies.

Henderson and Mapp (2003) summarize 51 studies that "attempted to break new ground, either in defining student outcomes, ways that families and community members were engaged, or theories of change" (p. 13). The studies included a variety of design types, topics, ages and grade levels. They concluded that research studies found a positive correlation between family involvement and benefits to students.

As discussed by Henderson and Mapp (2003), Starkey and Klein (2000) conducted an experiment to test the effects of a bi-generation (parent and child) mathematics intervention program with Head Start families. Between two sites, 60 families participated in classes designed to enhance parent support of pre-kindergarten mathematics skills. The parents also received mathematics activity kits to take home. Starkey and Klein (2000) concluded that parents who participated in training and received mathematics materials were more willing and able to assist their children in their mathematics school work. The research also revealed that the interventions provided by the parents at home were effective in enhancing the children's mathematical knowledge.

Also discussed in Henderson and Mapp (2003) is a study conducted by Westat and Policy Studies Associates (2001) in 71 Title-1 elementary schools to investigate student outcomes associated with specific aspects of curriculum and instruction as well as policy changes. The data collected included: standardized achievement tests, teacher surveys, interviews with district administrators and principals, focus groups of school staff and parents, classroom observations, collection of state and district policy documents, and information from student records. Results of the study showed that a high level of teacher outreach to parents of low-performing students was consistently linked to student gains in reading and mathematics. They also found that the extent to which parents are engaged in their children's studies is directly related to the level of academic achievement (Westat & Policy Studies Associates, 2001).

Jackson and Remillard (2005) examined parent-child interactions around learning mathematics to better understand how parents act as resources for their children. The researchers conducted semi-structured interviews with ten mothers living in low-income neighborhoods to elicit thoughts of the mother's own experiences with mathematics, and those of their children, both in and outside of school. They compared the patterns in the responses to Epstein's six types of involvement: parenting, communicating, volunteering, learning at home, decision making, and collaborating with community (Epstein & Salinas, 2004; Jackson & Remillard, 2005). As a result of their analysis, Jackson and Remillard (2005) offer a "parent centric" conception of involvement in education (p. 11). Their framework highlights ways that parents are involved in their children's learning outside of school-sanctioned events. They specify three forms of parental involvement: involvement in children's learning, involvement in children's schooling, and involvement in the children's school. According to Jackson and Remillard (2005), distinguishing between parental involvement in learning and in schooling is critical to understanding "parents' potential as intellectual resources for their children" (p. 12).

Parental involvement questionnaires. Cai (2003) uses a Parental Involvement Questionnaire (PIQ) to investigate the roles of parents in their children's mathematics learning in the United States of America and in the People's Republic of China. Cai also studies the relationship between parental involvement and students' mathematics problem-solving abilities. In this study, 232 US sixth-grade students and 310 Chinese sixth-grade students completed open-ended mathematics problems and their parents completed a 23-item PIQ. The results of the study reveal that "parental involvement is a statistically significant predictor of their children's mathematics achievement" (Cai, 2003, p. 87). Cai (2003) also found that the parents in China play a more positive role than parents in the US.

Of particular interest in Cai's (2003) study is his development and use of the PIQ. Cai, Moyer, and Wang (1997) identified five parental roles: motivator, resource provider, monitor, mathematics content adviser, and mathematics learning counselor. They created a reliable and valid 26-item PIQ that could be used to measure a parent's involvement in each of these roles. Each of the items on the PIQ is related to one of the five parental roles. In Cai's (2003) research, three items were omitted because of difficulties translating the questions into Chinese. For each item, parents must choose to *strongly agree, agree*, *disagree,* or *strongly disagree*. There is intentionally no neutral answer. For statements presented in a positive manner, such as “I help my child with homework,” *strongly agree* is assigned four points and *strongly disagree* is given one point. For statements presented negatively, such as, “I don’t know how to motivate my child to do a good job on his/her mathematics assignment,” *strongly agree* is assigned one point and *strongly disagree* is assigned four points. A score is then calculated for each parent in the categories of motivator, resource provider, monitor, mathematics content adviser, and mathematics learning counselor to determine which role each parent most identifies with.

Bicknell (2014) adapted Cai’s (2003) 23-item PIQ to better understand how parents of mathematically gifted and talented children in New Zealand were involved in their children’s mathematical developments. Using a case study approach, Bicknell (2014) collected data from three sources: parental involvement questionnaires, semi-structured interviews, and content analysis of school policies. Results of Bicknell’s (2014) study revealed that parents of mathematically gifted children typically recognize the unique talents of their children at an early age. She also found that the role parents most identified with was that of motivator, followed by mathematics content adviser.

Research on Education in Virtual Environments

The unique characteristics of virtual learning environments present many challenges for researchers of education (Black, 2009). The primary goal of any qualitative research, no matter the theoretical framework, is to study people or phenomena in their natural environment and understand the meanings that people attach to their own experiences (Yilmaz, 2013). The natural environment of an online learner is two-fold. First, there is the physical space which the student occupies. For example, the student might be working from a seat at his dining room table, a computer at the public library, or even a hospital bed. Next, there is the virtual space that the student engages in, such as the asynchronous digital content, online chat rooms, or synchronous online lessons. It is the role of the researcher to understand how the student operates in both environments and not assume that the behaviors are the same in each. The following sections review literature pertaining to online learning, particularly in mathematics, and parental roles in online learning courses.

Interactions in distance education. Interactions in online courses are critical to the student's overall experience (Banna, Lin, Stewart, & Fialkowski, 2015; Borup, Graham, &Davies, 2013; Kim, Parks, & Cozart, 2014). McIsaac and Blocher (1998) examined research on four constructs in distance education: transactional distance, interaction, learner control, and social context. McIsaac and Blocher concluded that the more conversations that occur between the student and teacher, the smaller the transactional distance and the more successful the learning experience.

Interaction in online education is broken into four types: learner-instructor, learner-content, learner-learner, and learner-interface (McIsaac & Blocher, 1998; Vrasidas & McIsaac, 1999). Borup, Graham, and Davies (2013) researched two other types of interaction in the online setting: learner-parent and parent-instruction. McIsaac and Blocher (1998) found that interactions greatly affect a student's overall experience in online education.

McIsaac and Blocher (1998) also found that students with an internal locus of control experienced greater success in online courses. Learner control includes independence to make choices, ability and skills, and human and material support (Baynton, 1992; Jackson, 2010). Learner control is affected by the locus of control (Kim et al., 2014). Students with an internal locus of control believe that they are capable of influencing the outcome of their situation and are more likely to persist in challenging educational endeavors (Curtis, 2013; McIsaac & Blocher, 1998). On the other hand, students with an external locus of control feel like they have less control of the situation and that their achievements and failures are more a result of luck or fate (McIsaac & Blocher, 1998).

New technologies can be credited with providing students the opportunity to engage in varying degrees of social presence (Lee, 2013; Sivin-Kachala & Bialo, 2009; Watson et al., 2010). McIsaac and Blocher (1998) found that both qualitative and quantitative data suggest that engagement of women in online communications is significantly less than that of men. Applying this information might allow educators to improve course design and more effectively motivate students to participate in ways that increase academic achievement.

Vrasidas and McIsaac (1999) use an interpretivist approach, within a symbolic interactionist framework, to study the complexities of the online education environment. The purpose of their research was to uncover factors influencing interactions, specifically student-teacher and student-student interactions. The unit of study was a graduate online course that met face-to-face for five weeks and then finished the semester rotating between face-to-face and online courses. Vrasidas and McIsaac (1999) triangulated their research by collecting data through observations, interviews, and an analysis of all student and teacher online communications. Vrasidas and McIsaac (1999) determined four major factors that influence interactions in a course: structure, class size, feedback to students, and participants' prior experience with computer-mediated communication.

Interaction has been recognized as a major construct in distance education research (Borup, Stevens, & Waters, 2015; Dixson, 2010; Mallan, Ashford, & Singh 2010; McIsaac & Gunawardena, 1996; Moore, 1989; Vrasidas & McIsaac, 1999; Wagner, 1994; Zimmerman, 2012). Sivin-Kachala and Bialo (2009) conducted an evaluation research study in an effort to compare social skills of students in full-time, online public schools to students in traditional public schools. Sivin-Kachala and Bialo's (2009) research involved over 250 students from four different online schools, enrolled in grades 2, 4, and 6. Parents, teachers, and students used the Social Skills Rating System (SSRS) to complete evaluations of students' social skills and problem behaviors.

Sivin-Kachala and Bialo (2009) compared responses on the evaluations to national norms and found that students in online schools have social skills that are superior to or not significantly different than students in traditional schools. Watson, Gemin, Evergreen Education Group, and Coffey (2010) suggest that students in online courses have superior social skills because online courses can promote cooperation among diverse and geographically separated students.

Artino (2009) sought to determine the extent to which the nature of a course is associated with the students' thoughts, feelings, and interactions. Artino (2009) collected surveys from 481 undergraduate students in an online course. An analysis of the surveys revealed that motivational beliefs and self-regulatory behaviors are correlated to a student's relation to the content and the nature of the online course.

Mallan, Ashford, and Singh (2010) conducted focus groups with students from Australia to gain information on how students interact with digital technologies. As a part of their research, Mallan et al. (2010) coined the term *iScapes* to describe "the construction of individual subjectivity or identity within and between the scapes of e-technologies and landscapes" (p. 267). Results of their research highlight the important role that technology plays in the development of youth.

Borup, Graham, and Davies (2013) analyzed 82 parent-student paired survey responses to investigate the quantity of interactions at an online charter school, the perceived motivational value of these interactions, and the correlation between interactions and course achievement. The results of their research revealed that parents perceived learner-instructor communication as being the most motivational for their child, and learner-learner least motivational. Students reported learner-instruction and learner-parent interactions as statistically significantly more motivating than learner-learner, parent-instructor, or learner-content. The researchers found that students viewed learner-parent interactions statistically significantly more motivational than did their parents. They also discovered a negative correlation between the frequency of interactions and the course outcomes. The researchers propose that this is perhaps because interactions might increase following poor performance.

Just as students have different perceptions of online learning, so do principals. Quilici (2011) used a case study approach to investigate the roles of principals of online schools in Idaho. Quilici interviewed six principals and seven teachers. The main finding of this research was the different perceptions of principal roles by principals and teachers. Principals viewed their role as instructional, “helping teachers so students can be successful” (Quilici, 2011, p. 151). Teachers, on the other hand, viewed the online principals as being more managerial, enforcing the “supervision and evaluation rubric and managerial policies” (Quilici, 2011, p. 151). Interestingly, all of the principals involved in this study stated that they intentionally avoided interacting directly with the students for fear of distracting students from focusing on their online teacher.

Motivations to choose online learning environments. Morabito (2010) took a grounded theory approach to examine the motivations of high school students in Pennsylvania to choose asynchronous online learning environments. Morabito's (2010) goal was to generate a theory as to why students choose online courses and their subsequent perceptions of success in those courses. She used the results of an archived student survey to identify preliminary themes to write her interview questions. Through a structured interview process, Morabito (2010) identified four themes pertaining to students' reasons for leaving the traditional setting (push factors), the perceived benefits of the online setting (pull factors), and to what students attribute their success in the online setting:

1. Classroom setting,
2. Flexibility of setting,
3. Individualized curriculum, or
4. Social issues related to school culture.

When Morabito (2010) studied responses at the individual level, she found that the characteristics students described as being detrimental in the traditional classroom (push factors) often aligned to the perceived benefits of the online setting (pull factors). However, the "success attributed to" theme almost never aligned with the push/pull factors at the individual level. Morabito (2010) reported that no single subject gave responses to all three questions that fell within the same category. For example, one student's responses to the push/pull factors fell within the "Classroom setting" theme, but his response to "success attributed to" fell within the "Individualized curriculum" theme (p. 186). Another student stated "Classroom setting" as her push factor, "Flexibility of setting" as her pull factor, and attributed her success in the online setting to "Individualized curriculum" (p. 189). The findings of Morabito's research provide insight into reasons students choose online courses and their perceptions of success, however more research is needed before generalizing to more diverse populations.

Artino (2010) examined the relationship between students' choice of instructional format (online versus face-to-face) and personal factors such as self-efficacy for learning online, task value, and feelings of satisfaction with recent online learning experiences. Artino (2010) collected 564 surveys from undergraduate students who had recently completed an online course. The survey assessed motivational beliefs, achievement-related emotions, and satisfaction with the course. Artino (2010) found a statistically significant positive correlation between indicating a preference to take future classes online and higher levels of self-efficacy for learning online, as well as greater satisfaction with their recent online learning experiences. Artino (2010) found a negative correlation between task value and a preference for taking a course online, suggesting that when students find higher value in a course they are more likely to choose a face-to-face format.

Attendance in an online course. Morabito (2010) found that one of the reasons students choose to take classes online is the increased flexibility of attendance. Research shows that regular attendance is a key to success in school settings (Gottfried, 2010; Musser, 2011; Roby, 2004). Attendance is the first criteria for access to school-based learning activities and interventions (Finn, 1993). However, measuring and tracking attendance in an online course is difficult because students are able to work at any time, from any place. The teacher cannot simply look around the room and mark students present or absent (tracking). One hour of activity in an online course may or may not equate to a day in the classroom (measuring). What takes one student two hours to master might take another student 30 minutes. Therefore, how do online programs that emphasize the benefits of students working with flexibility of location, time of day, and especially pace, track and measure attendance?

Archambault, Kennedy, and Bender (2013) made clear that, no matter the challenges, “virtual schools have an equal responsibility to assure that students are attending lessons, progressing in their learning, and benefitting from instruction” (p. 2). The authors used case study methodology to explore how traditional attendance and truancy laws apply to online students and investigate the impact of enforcing cyber-truancy policies at Minnesota Virtual High School (MVHS). Results of the study showed that a critical component of the attendance tracking process is educating parents on the uniqueness of tracking attendance in an online setting. The researchers explained the importance of having one-on-one meetings with parents before, or as soon as, a truancy issue is expected (Archambault et al., 2013).

Roles of Parents in Virtual Learning Environments

The role of parents in virtual learning environments is a critical element to a student’s success (Black, 2009; Currie-Rubin & Smith, 2014; Curtis, 2013). Parents occupy the physical space normally held by the teacher in a traditional classroom (Black, 2009; Waters, Menchaca, & Borup, 2014). As students navigate online material and assignments, the parent or adult in the home takes on the responsibility of answering questions, reinforcing completion of lessons, and ensuring that students are engaged and remain on task (Bicknell, 2014; Currie-Rubin & Smith, 2014). Teachers recognize that parents do not always understand the importance of their role and may not always have the background knowledge necessary to most effectively facilitate online learning (Currie-Rubin & Smith, 2014). Likewise, Waters, Menchaca, and Borup (2014) reported that “parents of students enrolled in K-12 online courses were not well informed of the level of involvement they were expected to undertake” (p. 309).

In an effort to describe the role of the family in online learning, Currie-Rubin and Smith (2014) consider research about effective ways to engage parents and teachers. They describe actions of parents who they consider to be actively engaged, taking on the role of the teacher and assuming responsibility for making the learning engaging. Currie-Rubin and Smith (2014) explain that teachers of online courses often expect parents to take on the responsibility of guiding children through challenging problems, to make modifications or work with the teacher to suggest modifications, to communicate challenges and successes, and to be available to the teacher to discuss the child's progress in online courses.

Black (2009) used quantitative methods to evaluate the influence of family involvement on student achievement in K-12 online schools. A survey instrument was adapted from the Hoover-Dempsey and Sandler (1997) model of parental involvement, see Figure 3, and sent to over 10,000 parents of students enrolled in a state-level virtual school. Black's parent survey included four separate measurement variables: parent report of modeling, parent report of instruction, parent report of encouragement, and parent report of reinforcement. The student survey measured the student's perception of each of these variables.

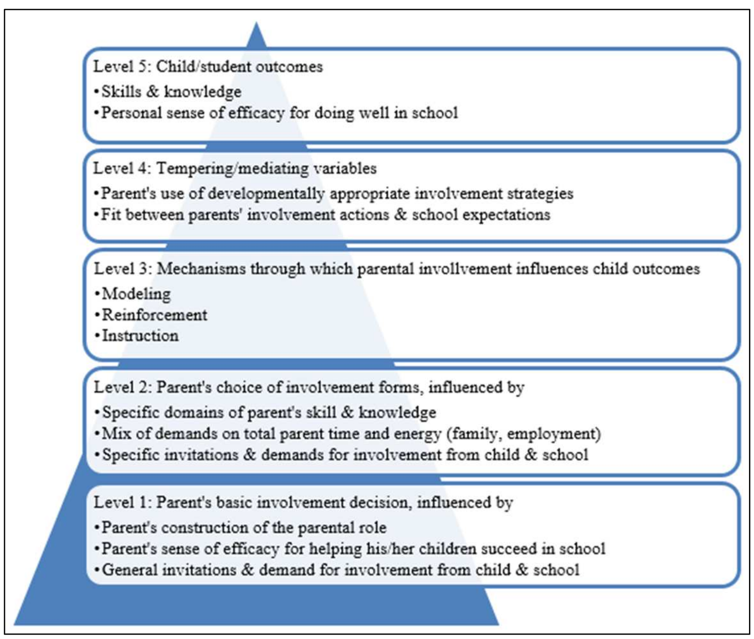

Figure 3. The researcher's depiction of the Hoover-Dempsey and Sandler (1997) model of parental involvement process.

Nine hundred and forty parents participated in Black's (2009) research, the results of which were conflicting. Black found that a parent's perception that they praise their child for school activities was positively related to a child's academic achievement in an online course. Interestingly, he found a negative relationship between a parent's perception of engaging in instructional activities, such as teaching problem solving, and a child's academic achievement. The data revealed that "familial involvement was predictive of academic achievement in a subset of parents, (Parent Group C, Parents Whose Child Did Respond to the Survey, n=164)" but not in the larger group of all parents (p. 99). The myriad of results suggest that the role of parents in virtual schooling is complicated and that there is still much research to be done (Black, 2009).

Curtis (2013) also investigated the effect parents have on student success in a full-time, online learning environment. Curtis (2013) uses Epstein's (2001) discussions on family, school, and community partnerships as the theoretical framework for this study (see Figure 2 for Epstein's framework of parental involvement). Curtis collected data by analyzing 350 student records and through semi-structured interviews with eight parents. The purpose of the record analysis was to look for correlations between factors such as grade level, gender, socio-economic status, family configuration, education level of parents, and previous experience with online learning.

Curtis (2013) found statistically significant correlations between grade point average (GPA) and socioeconomic status, education level of the parent, gender, previous online experience, and family configuration. Though not strong, the grade level of the student and GPA had the greatest correlation coefficient; the higher the grade level the higher the GPA. The second greatest correlation coefficient was for the relationship between GPA and family configuration; "GPA increases when students have more than one adult living in their home"

(Curtis, 2013, p. 78). This extends to parents, grandparents, aunt/uncle, foster families, step-parents, and older siblings. Though statistically significant, all of the relationships were weak to moderate, rendering it necessary for Curtis (2013) to engage in qualitative methods to “gain further insight into the role of parental involvement in student success in the online environment” (p. 71).

Research of Mathematics Education in Virtual Environments

Rosa and Lerman (2011) used qualitative research methods to examine relationships established between the development of online identities and the teaching and learning of mathematics in an online learning course. As a result of the research, it was suggested that processes of “online learning in mathematics education brings important new aspects to our understanding of mathematical knowledge as a social construction” (Rosa & Lerman, 2011, p. 69). Online environments have grown increasingly prevalent in the lives of students. Therefore, Rosa and Lerman (2011) suggest that researchers and teachers have the responsibility of incorporating these online environments into their teaching strategies. However, Rosa and Lerman (2011) also acknowledge that “There has not been a great deal of research yet in this area” (p. 70). They suggest that research in online mathematics education calls for a qualitative research methodology to be adapted to online environments.

Existing Gaps in the Literature Pertaining to the Role of Parenting in Online Education

Existing gaps in the literature pertaining to the role of parenting in online education are made evident by Cavanaugh, Barbour, and Clark (2009). Cavanaugh et al. (2009) conducted a review of over 500 literature sources regarding online learning to provide a constructed content analysis. They concluded that, “While K-12 online learning programs have evolved and grown over the past decade, the amount of published research on virtual schooling practice and policy is limited" (Cavanaugh et al., 2009, p. 1). They found the literature to fall within five broad themes: models of virtual schooling, roles of professionals, benefits and challenges, adopted standards for the courses, and adopted standards for teaching. They broke each theme down into more specific categories, and yet still none dealt with family involvement.

According to Barbour and Reeves (2009), literature on virtual schooling has been focused on the benefits and challenges of virtual schooling. They contend that the benefits can be categorized into five main areas: expanding educational access, providing high quality learning opportunities, improving student outcomes and skills, allowing for educational choice, and achieving administrative efficiency. They separated the challenges into four categories: start-up costs, issues with technology access, accreditation of virtual schools, and student readiness and retention. As is evident by these categorizations, several themes are missing from the literature including topics surrounding the role of parental involvement in virtual schools.

Lerman (2013) explains that current research in education has been focused on the facilitation of technology-enhanced mathematics learning rather than the transformation of children's learning of mathematics as a result of technology. Lerman (2013) blames this on "lack of vision by policy makers, lack of financial resources, and the unsolved challenge of giving all mathematics teachers an opportunity to gain expertise in these technologies such that they can incorporate them into their thinking about teaching" (p. 41).

Though there exists a dearth of literature pertaining to the role of parenting in online education, specifically pertaining to mathematics, a "… lack of research is not a sufficient reason for refusing to take actions that have a high plausibility level of being appropriate" (Mukhopadhyay, Powell, & Frankenstein, 2009, p. 76). The number of online education programs available to high school students continues to grow at astounding rates (Black, 2009; Evergreen Education Group, 2015). Therefore, research is needed on how parents engage in these programs, specifically mathematics courses, to identify ways to improve student achievement. This is the gap that this research aims to fill.

CHAPTER 3

Methodology

The purpose of this study was to examine the nature of parental involvement in high school online mathematics courses. Guided by the major tenets of a symbolic interactionism theoretical framework, I explored the following questions:

1. What are the factors contributing to parents' choice of online mathematics programs over traditional, brick-and-mortar, programs for their children?
2. What are parents' expectations of the program, teachers, and their own children?
3. How do parents define and describe their roles as their children are engaged in learning mathematics through online programs?

To better understand parental involvement in online mathematics courses, it is helpful to know why parents choose online courses for their children in the first place. Knowing the parents' motivations for switching into the online setting can provide insight into their desires and expectations of a learning program. This information could help teachers and school administrators better understand parents and consequently improve their efforts to build relationships that support their students toward achieving success.

The second research question is centered on parents' expectations: expectations of the program (school administrators and counselors), expectations of the teachers, and expectations of their own children. In this research study, I take a deeper look at the actions parents expect of each of these actors in the online mathematics course.

At the heart of this research study is the goal of understanding how parents define and describe their own roles in the online learning environment. Epstein and Salinas (2004) describe six types of parental involvement in a child's education: parenting, communicating with the school, volunteering at the school, learning experiences at home, decision making at the school level, and collaborating with the community (see Figure 2). I strive to learn how different types of involvement are represented in an online school program, particularly in an online mathematics course.

Theoretical Framework

This research study was guided by the major tenets of symbolic interactionism: self-talk, social interaction, and meaning making (Blumer, 1969). Figure 4 is a conceptual model of the major tenets of symbolic interactionism. People make meaning as a result of their interactions with other people. These interactions inform self-talk, or thought, which in turn influences and sometimes alters the meanings that people have of objects (Blumer, 1969). Meaning making is a perpetual cycle that affects and is influenced by social interaction and self-talk.

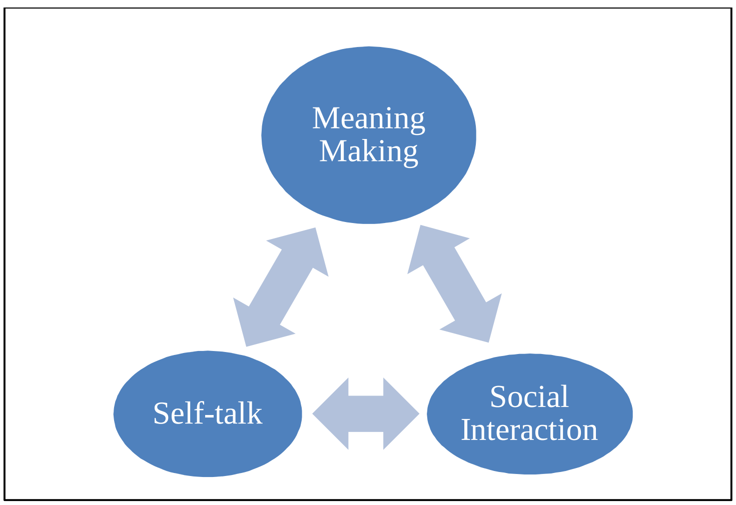

Figure 4. Researcher's depiction of major tenets of symbolic interactionism. This image illustrates the perpetual cycle of meaning making through self-talk and social interaction.

As a consequence of the flexibility and personalization that is offered through online learning, each student and parent will have a unique experience. Symbolic interactionism allows the researcher to listen to different experiences, reaching for a better understanding of how those experiences are described and defined. In this study, symbolic interactionism was a useful approach to better understand how parents perceive their own involvement in their child's online mathematics course.

Study Design

In this research study, I employed a qualitative exploratory embedded single-case design to examine the nature of parental involvement in high school online mathematics courses. The rationale behind using case study design was to provide a holistic mode of inquiry (Cisneros-Cohernour & Stake, 2012). According to Yin (2003), case study is a relevant research strategy when the form of the research question is how or why, when the study requires no control of behavioral events, and when the focus is on contemporary events.

Yin (2003) describes three purposes or types of case studies: exploratory, descriptive, and explanatory. Yin (2003) explains that exploratory case studies are appropriate when the goal is "to develop pertinent hypotheses and propositions for further inquiry" (p. 6). The purpose of the current research study was to explore the nature of parental involvement, exposing areas for further research. Therefore, exploratory case study was an appropriate strategy. Furthermore, case study research is an appropriate framework for exploratory research in real-life settings, such as online educational settings (Cronin, 2014; Yin, 2009).

This study is an embedded single-case study, bounded by the fact that research was conducted in only one school. The case, or focus of the study, was the parents of high school students taking online mathematics courses. The basic unit of analysis was parental involvement:

how, what, why, when, and where. There were several subunits of analysis yielding “a more complex- or embedded- design” (Yin, 2003, p. 46). The subunits in this study include reasons parents choose to enroll their children in online mathematics courses and parents’ expectations surrounding online mathematics courses. According to Yin (2003), embedded subunits of analysis can significantly enhance the insights into a single case. Figure 5 illustrates the basic design for this case study.

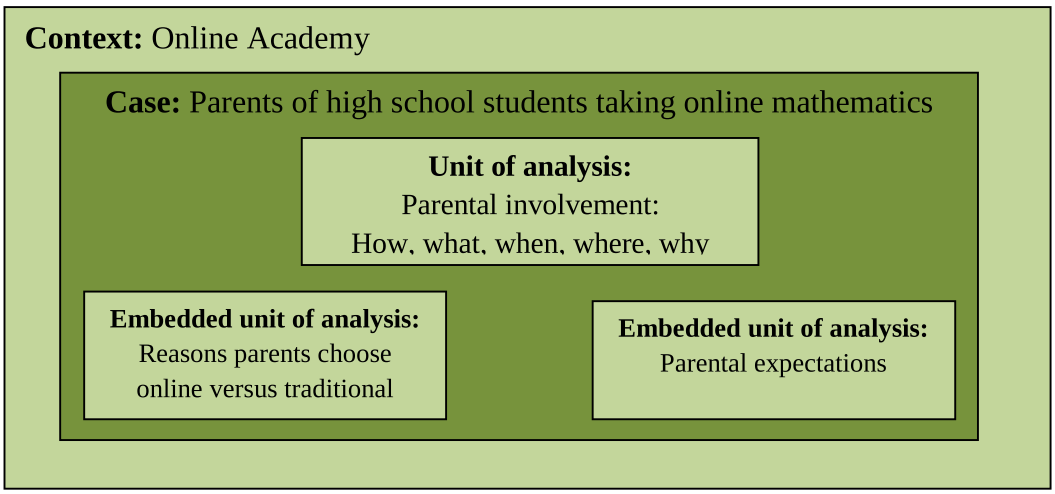

Figure 5. The context, case, and units of analysis of this research study.

Study Context

Demographics. Located outside of a major metropolitan area in the southeastern United States, Online Academy (pseudonym) is a program available to all students in the school district. According to the United States Census Bureau, the population of the county was just over 200,000 in 2014. Many other characteristics are made available by the United State Census Bureau, including:

- About 10% of households report speaking a language other than English in the home.
- About 90% of people aged 25 or older have graduated from high school.
- About 25% of people aged 25 or older have earned a bachelor’s degree or higher.

- The median annual household income is approximately $60,000.
- About 50% of the county population is white, about 40% is black or African American, and about 3% is Asian.

The demographics of all students enrolled in the district schools is made available on the district's website. The population of students is almost equally black and white, with about 15% being Hispanic or other. According to the school district website, over half of the student population is classified as economically disadvantaged (participate in the free or reduced lunch program). About one fifth of the student population is flagged as participating in the early intervention program and over 10% as being gifted. Over 10% of the population participates in the special education program. The exact source of the demographic information is not cited to maintain the anonymity of the school being researched.

The demographics of the online program being researched in this study are not necessarily reflective of the school system as a whole. A recent accreditation summary revealed the race/ethnicity of the student population at Online Academy:

- About 60% White,
- About 25% African American,
- About 6% Hispanic,
- About 5% Multi-Racial, and
- About 4% Other.

In the accreditation report, it is noted that Online Academy serves a large contingent of students who come from either a private-school or home-school setting. It is stated that the school is challenged by having a high number of at-risk students, defined in the report as students with significant learning gaps and a history of being held back and failing classes prior to enrollment at Online Academy. To illustrate this point, the report tells of a group of teachers who reviewed their students’ demographic data and discovered that almost half of all students in their grade level averaged 20 days absent from school the previous school year (at their home school) and that 25% had been held back while in middle school.

History of the program. Online Academy opened as a virtual school program for students in grades eight through ten who desired to take some or all of their courses online, while maintaining enrollment at a traditional school. The school now serves students in grades six through twelve and offers courses in all core content areas as well as many elective courses. Students can choose to take some or all of their courses with Online Academy. In the Executive Summary, it was reported that 75% of students choose to take all of their courses through Online Academy. Students must be registered at a traditional, brick-and-mortar school within the district, even if they plan to never step foot on that campus. This school is commonly referred to as their home school. Because students are officially enrolled at their home school, they are eligible to participate in clubs and sports at their home school.

The courses at Online Academy are facilitated entirely online using a third-party content provider and learning management system (LMS). Some of the online activities include instructional videos, practice assignments, online labs, essay writing, and assessments. Though the types of activities may differ from class to class, all of the activities are asynchronous. Students are encouraged to take advantage of synchronous face-to-face tutoring and online webinars, especially if they are struggling in a course. Students also have the option to participate in a Guided Learning Project (GLP) to replace content that would otherwise be completed online in the LMS (school website). On the school’s website, GLPs are described as projects that encourage students to dig deeper into a topic of interest while providing variety in their course delivery. Projects are initiated by students, who then work with their teacher to create a detailed plan for the project.

In less than four years, the entire faculty of the Online Academy has grown from just four teachers and a part-time counselor to over 20 teachers, two full-time counselors, two administrative assistants, a full-time principal and a full-time assistant principal. Enrollment is quickly approaching 1,000 students. This dramatic increase is due largely to the transferring of traditional school students as a result of increased awareness of the program.

Students and parents in Online Academy each have their own account for the learning management system (LMS) and the student information system (SIS). Through the student accounts, a student can access real-time progress, including grades on individual assignments, time spent on individual assignments, feedback from teachers, emails to and from teachers, a pacing guide of assignments, the overall (average) grade on attempted assignments, the actual course grade including zeros on assignments that have yet to be completed, and the percentage of the course that has been completed. Students are able to work at their own pace to complete assignments as long as all assignments are completed by the end of the semester. An assignment calendar is offered as a tool to help students stay on track for completing the course by the end of semester deadline. The parent accounts are referred to as guardian accounts in the SIS. In the guardian account, users can access time spent actively logged into specific courses, student emails, and detailed progress reports.

Participants

Sample selection. The sample of this study was comprised of 87 questionnaire participants and six interview participants. Participants were parents of students enrolled in high school level mathematics courses at Online Academy (pseudonym). Online Academy is an online school program of choice for students in middle and high school. At the start of the 2014-2015 school year, there were over 300 students taking online, high school level mathematics courses with Online Academy. During the registration process, each student is required to have one or two parent emails associated with their account. This information is used to generate guardian accounts. For this research study, participants were recruited by using the student information system (SIS) to send a bulk email to all 528 guardian accounts associated with a student taking a high school mathematics course (see Appendix D for a copy of the email). The email included an explanation of the research project along with an invitation to participate in the online questionnaire. At least 11 of the 528 emails were returned as undeliverable. Overall, I surmise that 517 emails were successfully delivered. Eight-seven parents started the survey, representing a 16.8% response rate and six parents participated in an interview. Attrition and missing information is discussed in detail in the Results' section.

The original purpose of the questionnaire was to gather demographic information about the parents of students in Online Academy, to learn more about parental involvement at Online Academy, and to recruit participation in a follow-up interview. Nine parents volunteered to participate in an interview, fewer than expected. Therefore, there was no need to use questionnaire results to purposefully select which parents to contact for an interview. Instead, all nine volunteers were contacted and six successfully participated in an interview.

Demographic information about the parents in this study was collected in the questionnaire to explore potential relationships between demography and the research questions. Though 87 parents started the questionnaire, two dropped out before answering the first question. Eighty-five parents completed at least some part of the questionnaire. Out of a pool of the 74 participants who completed the PIQ portion of the questionnaire, 67 identified a race/ethnicity (see Table 2), 64 indicated household income level (see Table 3), and 69 reported highest education levels (see Table 4).

Table 2
Race/Ethnicity of Questionnaire Participants

Race/Ethnicity of Parent	n	%
White / Caucasian	40	59.7%
Black or African American	24	35.8%
American Indian or Alaskan Native	1	1.5%
Asian / Pacific Islander	1	1.5%
Hispanic	1	1.5%
Total	67	100%

Table 3
Household Income Level of Questionnaire Participants

Household Income Level	n	%
$0 - $24,999	2	3.1%
$25,000 - $49,999	8	12.5%
$50,000 - $74,999	15	23.4%
$75,000 - $99,999	8	12.5%
$100,000 - $124,999	17	26.6%
$125,000 - $149,000	3	4.7%
$150,000 and up	11	17.2%
Total	64	100%

Table 4
Highest Education Level of Questionnaire Participants

Highest Education Level	n	%
Graduated from high school	10	14.5%
Some college	16	23.2%
Associate’s degree	9	13.0%
Bachelor’s degree	17	24.6%
Some graduate school	4	5.8%
Completed graduate school	13	18.8%
Total	69	100%

A summary of characteristics describing each of the six interviewed participants is provided in Table 5. The table includes each interviewee’s initials and the number assigned to their questionnaire responses as well as their relationship to the child, race/ethnicity, highest level of education, and total household income.

Table 5
Demographics of Interviewed Participants

Initials	Parent No.	Relationship to child	Race/ethnicity	Highest level of education	Total household income	Time enrolled in an online mathematics course
A.P.	7	Mother	American Indian or Alaskan Native	Associate's degree	$50,000 - $75,000	Less than 1 month
C.D.	48	Mother	White	Completed graduate school	$50,000 - $75,000	1-3 months
D.B.	41	Father	White	Bachelor's degree	$150,000 and up	2 years or more
G.S.	50	Mother	White	Some graduate school	$50,000 - $75,000	2 years or more
J.D.	28	Father	White	Completed graduate school	$150,000 and up	1-2 years
M.B.	46	Mother	White	Bachelor's degree	$150,000 and up	3-6 months

Note. The initials used to identify interview participants are not their actual initials. The parent number is the number that was assigned to the parent's questionnaire response.

Methods

Data Collection Techniques

Data was triangulated using two data collection techniques: online questionnaires and interviews. The rationale for using questionnaire methods was to recruit participation in a follow-up interview, to gather demographic information about the parents of students in Online Academy, and to learn more about parental involvement at Online Academy.

Questionnaire instrument. Data was initially collected using an online questionnaire to obtain background information on the parents, to learn about parental involvement and engagement at Online Academy, and to recruit parents for a follow-up interview. The questionnaire was sent via email to all 528 parent accounts associated with a student in a high school level mathematics course (see Appendix D for a copy of the initial email to parents). The questionnaire was expected to take 15-30 minutes to complete.

The questionnaire was created using Qualtrics Survey Software and designed so that parents could respond anonymously. The survey link was embedded in an email that was sent to all 528 parent email addresses associated with students enrolled in a high school level mathematics course at Online Academy during the 2015-16 school year.

The first part of the questionnaire was adopted from Cai's (2003) Parental Involvement Questionnaire (PIQ) (permission received from author) which includes 23 items to which parents respond with *strongly agree*, *agree*, *disagree*, or *strongly disagree* (see Appendix A for a list of the PIQ items). I followed methods used by Cai (2003) and Bicknell (2014) to score parents' responses to the PIQ: for PIQ items that are read as a positive statement, such as "I am able to help my child with mathematics homework," *strongly agree* was assigned a score of 4 and *strongly disagree* was assigned a score of 1; for questions presented in the negative, the converse was applied. The wording of the questions was altered just slightly to fit the context of this research study. For example, I used the word "schoolwork" in place of "homework" because parents and students at Online Academy do not differentiate between the two. Cai (2003) linked each item of the PIQ to one of five categories he described as major parental roles: motivator, resource provider, monitor, mathematics content adviser, and mathematics learning counselor.

In addition to the 23 items from Cai's (2003) PIQ, the questionnaire in this research study included six multiple-choice background or demographic questions, two multiple-choice questions pertaining to frequency of involvement with the online mathematics course, and nine open-ended questions pertaining to why parents enrolled their children in an online mathematics course, parents' expectations surrounding the online mathematics course, and parents' perceptions of success in an online mathematics course (see Appendix B for a list of the specific questionnaire items). Frary (2012) states that the researcher should determine what information is sought after and then write as few questions as possible to obtain it. A questionnaire that is too long can be frustrating for respondents, leading to a lack of participation or incomplete responses. Therefore, the questionnaire used in this case study research was intended to be concise. The major tenets of symbolic interactionism—self-talk, social interaction, and meaning making—were carefully considered during the construction of the questionnaire. The open-ended questionnaire items afforded participants the opportunity to reflect on their thoughts (self-talk) as they made sense of their responses (meaning making) and communicated their ideas as they engaged in an discursive dialogue with the researcher (social interaction).

At the end of the questionnaire, parents were given the opportunity to volunteer to participate in a 30-45 minute interview and provide their phone number and/or email address. It was explicitly noted that if a participant provided his or her contact information, questionnaire responses would no longer be anonymous. However, parents were reminded that responses would remain confidential and in no way affect the treatment of their child. If a parent did not want to complete the questionnaire but did want to participate in an interview, he or she could simply reply to the initial email with their preferred contact information.

Semi-structured interviews. Parents of students in high school online mathematics courses at Online Academy were solicited to participate in a 30-45 minute interview. All nine parents who volunteered were contacted to schedule an interview, and six of the participant parents completed the interviews. The purpose of the interviews was to gain further insight into the nature of involvement of parents in online mathematics courses. According to Rubin and

Rubin (2012), the meaning people attribute to objects or events is of upmost importance. Within a symbolic interactionism framework, the purpose of each interview was for the parent to describe their own role(s) in their child's online mathematics course. To accommodate this goal, I planned for a semi-structured interview approach. To prepare for the interviews, I created an interview protocol form with a list of guiding and follow-up questions that I could refer to (see Appendix C). As described by Rubin and Rubin (2012), in a semi-structured interview, the researcher prepares questions aimed at a specific topic but plans to ask follow-up questions as needed throughout the interview. During the semi-structured interviews, questions were not always read verbatim nor were all of the questions used with each parent. I took a general interview guide approach which allowed me to instinctively adapt the interview questions, while ensuring that common areas of information were amassed from each interviewee (McNamara, 1999).

I allowed one full hour for each interview and employed a responsive interviewing style, with generally friendly questions and little to no confrontation (Rubin & Rubin, 2012). I began each interview by asking the parent to describe their experience with online schools. The open-endedness of this question allowed the parent to answer in many different ways. This provided me with information to then follow-up on. During all six interviews, I used verbal encouragement to motivate the parents to keep talking ("That's interesting.", "Uh huh…", "And what did you think about that?"). This interview style supported my goal of truly hearing the parents and letting themes emerge naturally. I made sure to conclude each interview by asking the parent if he or she had anything else they would like to add about their experience as a parent of a child in an online mathematics course. In accordance with the major tenets of symbolic interactionism, my intent during the interviews was to genuinely hear the voices of the parents and understand how each made meaning regarding their involvements in the online mathematics course.

The interviews were recorded using the smartphone app, TapeACall. TapeACall is a program that allows the user to record a phone call, saving the recording to the phone. The user may then download the recording as an MP3 file. The MP3 files for this research study were individually downloaded, then uploaded to a computer for the transcription process. The interviews were transcribed using transcribe.wreally.com, a software program that manipulates the keyboard commands to act much like a foot pedal. Once each interview recording was transcribed, the original file was deleted from the smartphone. The audio and transcription files were stored on an external flash drive.

Procedure

The procedure for conducting this research began with obtaining permission from the principal of Online Academy as well as applying for approval from the school district. Both of these tasks were accomplished prior to applying for and receiving approval from the Institutional Review Board (IRB) at the university level (see Appendix E).

At the end of first semester, in December, 2015, about one month before I planned to initiate data collection, I used the student information system (SIS) to create a filtered report of all parent/guardian email addresses linked to students in a high school level mathematics course at Online Academy. This was necessary to gather email addresses for students who were only taking a mathematics course during first semester. If I had waited until January, the students who completed a mathematics course first semester, but were not taking a mathematics course second semester, would not have populated in my search. About two weeks into second semester, I created an updated report of all parent/guardian email addresses linked to students enrolled in a high school level mathematics course and merged it with the report created in December. I deleted duplicate addresses to have a precise list of parent/guardian email addresses for students enrolled in a mathematics course first semester and/or second semester. This resulted in 528 parent/guardian email addresses.

All 528 parents of students enrolled in a high school level mathematics course first and/or second semester were sent an email explaining the purpose of the research, a link to the questionnaire, and an invitation to participate in an interview. The emails were sent using a Georgia State Outlook Email account rather than through the SIS so as not to appear to be a required activity being sent from a teacher at Online Academy (see Appendix D: Initial Parent Email). Attached to the email was a copy of the Informed Consent form (Appendix F).

Parents were presented with two opportunities to volunteer to participate in the interview. First, parents could respond directly to the email stating their willingness to participate in an interview and provide their preferred contact information. Second, at the end of the online questionnaire was a question regarding interest in participating in an interview with the option to provide contact information. I created a list of all nine parents who volunteered to participate in an interview, along with their preferred contact method. An attempt was made to contact all nine parents, either via telephone or email, depending on the preferred contact method they indicated. The potential interview parents were presented with the option of participating in the interview in person, virtually using an online meeting platform, or over the telephone, with an emphasis on meeting in person or virtually. I successfully contacted seven of the nine volunteers, all of whom asked to participate in the interview over the phone. Next, we agreed upon a mutual day and time for me to call and conduct the interview. I followed up with an email containing the agreed upon date and time for the interview along with a copy of the Informed Consent Waiver of

Documentation form (Appendix I). One of the seven scheduled interviewees did not answer the phone on the day of the interview and I was unsuccessful in rescheduling the interview. Therefore, six total interviews were performed.

Data Analysis

The focus of data analysis was on themes that emerged through a detailed examination of the questionnaire responses and interview transcriptions. The basic unit of analysis was parental involvement: how, what, why, when, and where. Reasons parents chose to enroll their children in online mathematics courses and parents' expectations of online mathematics courses constituted sub-units of analysis. The online questionnaire solicited categorical, descriptive narrative, and open-ended responses. As a result, two types of data were collected during this study: quantitative and qualitative.

Descriptive analysis. The primary purpose of the online questionnaire was to gather background data on the participating parents, to solicit participation in an interview, and to assess the levels of parental involvement in the online mathematics courses at Online Academy. The quantitative questionnaire responses were analyzed using Qualtrics Survey Software reports and Microsoft Excel. Using a Microsoft Excel spreadsheet, the questionnaire responses were organized into rows (individual responses) and columns (questions). Analysis took place using both Qualtrics and Excel, as is described in greater detail in the Results chapter of this paper.

Open-ended questionnaire items and interviews. Responses to the open-ended questionnaire items were coded alongside the interview transcripts using NVivo research software (see below for a description of coding procedures). The goal of the analysis was to identify themes across the parents' responses to questions about choosing an online mathematics program, expectations surrounding the program, and interactions with the program. According to

Rubin and Rubin (2012), a theme is a “statement that summarizes what is going on, explains what is happening, or suggests why something is done the way it is” (p. 118). As the researcher, I constantly triangulated parents’ responses from the interviews to better identify inherent categories that would facilitate the extraction of emerging themes, which might at first seem ambiguous. Following the protocol suggested by Saldaña (2013) I moved from codes to categories, and then to concepts and themes. The themes that arose from the questionnaire responses informed the questions for the interviews.

All six interviews were transcribed verbatim and then coded using NVivo research software. According to Saldaña (2013), coding is “an exploratory problem-solving technique without specific formulas to follow” (p. 8). Though there is no perfect formula for coding data, there is a logical order to coding which is described below. During all stages of the coding process, I was guided by the major tenets of symbolic interactionism to ensure that emerging themes genuinely reflected parents’ own perspectives and ideas.

The act of transcribing served as the first step of the coding process. As I listened and transcribed the recordings of the interviews, I made notes of themes and codes that seemed to emerge. The second step of the coding process occurred as I read over my notes and created a list of pre-codes (Saldaña, 2013). The third step was to reread the interview transcripts, coding for patterns, looking for similarity, difference, frequency, sequence, correspondence, and causation (Hatch, as cited in Saldaña, 2013). Though many themes started to appear, I followed the advice of Rubin and Rubin (2012) and focused on coding the ones that I thought would lead to a better understanding of the research problem.

Next, I moved from codes to categories, and then to themes and concepts, step four in the coding process (Saldaña, 2013). After coding the interviews, I examined the frequency of codes, combining and deleting codes as necessary. The data and codes were regrouped to look for emerging categories. Three concepts emerged:

1. Reasons for switching to the online mathematics course.
2. Parents' expectations of students, teachers, and the school.
3. Parents' roles and responsibilities.

The fifth step in the coding process was to refine the codes based on additional readings. Coding is cyclical and several rounds of coding were required to focus in on the salient features of the data (Saldaña, 2013). The remaining codes were sorted based on similar characteristics leading to the emergence of 17 categories (see Figure 6).

Access to resources	Good grades	Quality curriculum
Challenge	Identify student needs	Teacher accessibility
Communication	Instructional support	Teacher approachability
Distractions in the classroom	Learning for understanding	Teacher effectiveness
Effort	Monitor	Time management
Good at math	Negative social environment	

Figure 6. Categories that emerged through a process of coding the qualitative data.

The sixth and final step of the coding process was to move from codes and categories to themes and concepts. Rubin and Rubin (2012) explain concepts as "*ideas,* often expressed as a single noun or noun phrase" (p. 193). Rubin and Rubin (2012) identify concepts that reflect jargon particular to the field, concepts embedded in metaphors, and concepts characterized by abstract nouns such as courage, fear, or self-control. They describe themes as "summary statements, causal explanations, or conclusions" stating that, "If a statement contains words like *because, therefore,* or *so that is why*, or if you can translate the sentence into that format, you most likely have found a theme" (Rubin & Rubin, 2012, p. 194).

A summary of the general procedures of coding is as follows:

Step 1: Listen and transcribe interviews. Make notes of emerging codes and themes.

Step 2: Review notes from step 1. Create a list of pre-codes.

Step 3: Read the transcripts, coding data using the pre-codes.

Step 4: Regroup the data to look for categories.

Step 5: Refine codes and categorize based on additional readings.

Step 6: Move from categories to themes and concepts.

The rationale for using both questionnaire methods and qualitative interviews was to collect more data than if just one method were employed (Chenail, 1995). The goal of this case study research was to paint a robust picture of the parents of students in online mathematics courses at Online Academy. This triangulation between what parents reported on a questionnaire and how they described their experiences during personal interviews helped create a clearer picture of how parents define their roles in online high school mathematics courses, as is described in the following chapter.

CHAPTER 4

Results

A qualitative exploratory embedded single-case design was employed to examine the nature of parental involvement in high school online mathematics courses at Online Academy [pseudonym], a virtual public school program located outside of a metropolitan area. Data was triangulated using online questionnaires and interviews. This chapter is an overview of the analysis methods used to extract the emerging themes as well as a description of these themes. I also include my interpretation of the research findings as guided by symbolic interactionism framework.

In this research, I was guided by the following questions:

1. What are the factors contributing to parents' choice of online mathematics programs over traditional, brick-and-mortar, programs for their children?
2. What are parents' expectations of the program, teachers, and their own children?
3. How do parents define and describe their roles as their children are engaged in learning mathematics through online programs?

The focus of data analysis was on recognizing emerging themes through examination of the questionnaire responses and interview transcriptions. The basic unit of analysis was parental involvement: how, what, why, when, and where. Reasons parents chose to enroll their children in online mathematics courses and parents' expectations of online mathematics courses constituted sub-units of analysis. The goal of the analysis was to identify themes across the parents' responses to questions about choosing an online mathematics program, expectations of the program, and interaction with the program. Following the protocol suggested by Saldaña (2013), I examined and analyzed the data collected from the questionnaire responses by moving from codes to categories, and then to themes and concepts. The preliminary themes that arose from the questionnaire responses influenced the writing of the questions for the semi-structured interviews.

Analysis of Questionnaire Responses

The purpose of the questionnaire was to gather background data on the participating parents, to solicit participation in an interview, and to assess the parents' levels of involvement. For the purpose of discussion, the questionnaire items can be divided into three groups: background and demographic information, Cai's Parental Involvement Questionnaire (PIQ), and open-ended questions addressing reasons parents chose to enroll their child in an online mathematics program and their expectations of the program. Responses to the questionnaire resulted in a combination of quantitative and qualitative data: descriptive narrative, categorical, and open-ended responses. All of the responses were downloaded from Qualtrics into a Microsoft Excel spreadsheet and organized into rows (individual responses) and columns (questionnaire items). Analysis took place using both Qualtrics and Excel, as is explained in the following paragraphs. Not all questions were required to be answered in order for the parent to move through the survey. Therefore, there are several holes in the data from unanswered questions:

- 85 parents answered the first three questions:
    - How many children do you have in a high school mathematics class at Online Academy?
    - Have you ever completed an online course?
    - Have you ever completed an online mathematics course?

- The 23 PIQ items were divided into five pages. The questions were intentionally sorted so that each page contained items from multiple roles. Refer to Appendix B to read exactly how the PIQ items were sorted.
    - 83 parents completed the first page of five questions.
    - 81 completed the second page of 5 questions.
    - 78 completed the third page of 5 questions.
    - 75 completed the fourth page of 4 questions.
    - 74 completed the fifth page of 4 questions.
- Seventy-one parents answered both of the following questions:
    - How often do you ask your child about his/her mathematics course?
    - How often do you help your child with his/her mathematics assignments?
- The open-ended questions had an average response rate of 61 participants.
    - Why did you choose to enroll your child in an online mathematics class?
    - How do you define success in an online mathematics class?
    - Based on your definition of success, is your child successful in the online mathematics course?
    - How is parenting in a traditional mathematics course different from parenting in an online mathematics course?
    - How is parenting in a traditional mathematics course the same as parenting in an online mathematics course?
    - In regards to your child’s mathematics class, what are your expectations of the school?

- In regards to your child’s mathematics class, what are your expectations of the teacher?
- In regards to your child’s mathematics class, what are your expectations of your child?
- In regards to your child’s mathematics class, what do you feel are your responsibilities as the parent?

- Sixty-nine parents answered the questions regarding race/ethnicity, household income and highest parental education level.

Cai’s Parental Involvement Questionnaire (PIQ). Following three background questions, parents were presented with Cai’s (2003) Parental Involvement Questionnaire (PIQ) (permission received from author). The PIQ includes 23 items on a 4-point Likert scale to which parents respond with s*trongly agree*, *agree*, *disagree*, and *strongly disagree*. Each item on the PIQ is linked to one of five major parental roles: motivator, resource provider, monitor, mathematics content adviser, and mathematics learning counselor (see Appendix B). The 23 Parental Involvement Questionnaire (PIQ) items had a high level of internal consistency, as determined by a Cronbach’s alpha of 0.851.

Qualtrics reported a mean for each parent in each parental involvement role, sensitive to the nearest hundredth. However, the Qualtrics report did not identify the category with the greatest mean. Therefore, the data was downloaded into Microsoft Excel and formulas were used to locate the role with the greatest mean for each parent and list out that role in a new column. More specifically, I used the Excel formula “max=” to locate the greatest mean within a chosen vector (the weighted average for each of the five roles). I then used an “=if” formula to program Excel to match the score to the column header, which in this case was the title of each parental involvement role. I created a new column with the name(s) of the role(s) that each parent scored the highest. The snapshot below is intended to provide a visualization of this process (Figure 7).

	A	I	J	K	L	M	N	O	P	Q	R	S	T
3	**Parent #**	Motivator-mean	Resource Provider-mean	Monitor-mean	Math Content Adviser-mean	Math Learning Counselor-mean	Highest mean	Motivator	Resource Provider	Monitor	Content Adviser	Learning Counselor	PIQ ROLE(S)
4	**1**	3.2	2	2.6	1.5	2.4	3.20	Motivator	0	0	0	0	Motivator
5	**2**	3.4	2.5	2.8	2.5	3.2	3.40	Motivator	0	0	0	0	Motivator
6	**3**	2.8	2.25	3.2	2.5	2.4	3.20	0	0	Monitor	0	0	Monitor
7	**4**	3.4	2.5	3.2	2.75	2.6	3.40	Motivator	0	0	0	0	Motivator
8	**5**	3.2	3	3.4	3	3	3.40	0	0	Monitor	0	0	Monitor
9	**6**	3	3	3.6	3.25	3.4	3.60	0	0	Monitor	0	0	Monitor
10	**7**	3	4	4	3.5	3.4	4.00	0	Resource Provider	Monitor	0	0	Monitor & Resource Provider

Figure 7. Determining PIQ role(s). This figure illustrates how the data was organized so that the PIQ role(s) could be determined for each parent.

Of the 74 parents who completed the PIQ portion of the questionnaire, 61 scored highest in a single category and 13 scored equally high in two or more categories. For comparison purposes, parents who did not score highest in a single PIQ role were grouped together with the title *multiple roles.* As a whole, most parents scored highest in the role of monitor (see Figure 8). A one-sample 2-tailed t-test of the mean score for each of the five parental involvement categories indicated that there is a statistically significant difference between the PIQ roles' categories ($p < 0.05$). Thus, the division between categories is statistically justified.

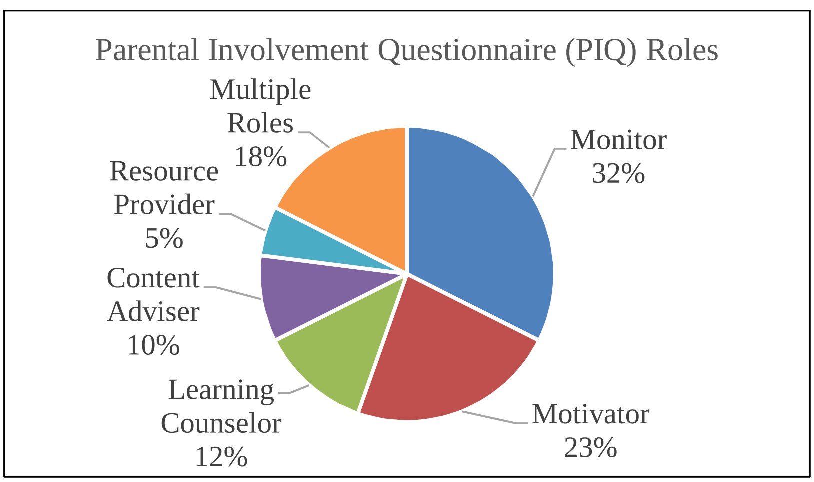

Figure 8. Parental roles as indicated by the Parental Involvement Questionnaire (PIQ), for all completed questionnaires.

With the questionnaire responses organized in a Microsoft Excel spreadsheet, I was able to compare quantitative data within and between groups using pivot tables. The purpose of creating the pivot tables was to gain a better understanding of the background data on the participating parents and their level of involvement. The PIQ roles were broken down within each race/ethnicity group (Table 6), household income levels (Table 7), and highest education level of the parent (Table 8). Analysis revealed that white parents were more likely to score highest in the monitor role, whereas black parents were more likely to score highest in the roles of motivator or learning counselor. Within this case study, it appears that household income level does not predict the parental role. When sorted into groups by highest level of educational attainment, parents in all groups scored highest in either the role of monitor or motivator, except for parents with an associate's degree. Most parents with an associate's degree fell into the multiple PIQ roles group.

Table 6
PIQ Roles Sorted by Race/Ethnicity

	Race/Ethnicity									
PIQ role	All parents		White		Black		Other		Unanswered	
	n	%	n	%	n	%	n	%	n	%
Monitor	24	32.4%	16	40%	4	16.7%	0	0	4	57%
Motivator	17	22.9%	8	20%	6	25%	0	0	3	43%
Learning counselor	9	12.2%	3	7.5%	5	20.8%	1	33.3%	0	0%
Content adviser	7	9.4%	5	12.5%	1	4.2%	1	33.3%	0	0
Resource provider	4	5.4%	0	0%	4	16.7%	0	0	0	0
Multiple roles	13	17.6%	8	20%	4	16.7%	1	33.3%	0	0
Total	74	100%	40	100%	24	100%	3	100%	7	100%

Note. The percentages represent the percentage within each category and not of the entire sample. For example, of all parents who selected *white* as their race/ethnicity, 40% scored highest in the monitor category.

Table 7
PIQ Roles Sorted by Household Income Level

PIQ role	$0-$49,999		$50k-$99,999		$100k-$149k		$150k and up		Unanswered		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Monitor	3	30%	3	13%	8	40%	6	55%	4	40%	24	32%
Motivator	1	10%	6	26%	4	20%	3	27%	3	30%	17	23%
Learning counselor	3	30%	3	13%	2	10%	1	9%	0	0%	9	12%
Content adviser	0	0%	4	17%	2	10%	0	0%	1	10%	7	9%
Resource provider	1	10%	3	13%	0	0%	0	0%	0	0%	4	5%
Multiple roles	2	20%	4	17%	4	20%	1	9%	2	20%	13	18%
Total	10	100%	23	100%	20	100%	11	100%	10	100%	74	100%

Household income spans all income columns.

Note. The percentages represent the percentage within each category and not of the entire sample. For example, of all parents who selected *$0-$49,999* as their household income, 30% scored highest in the monitor category.

Table 8
PIQ Roles Sorted by Parent Education Level

PIQ role	Graduated high school		Some college		Associates degree		Bachelor's degree		Some graduate school		Completed graduate school	
	n	%	n	%	n	%	n	%	n	%	n	%
Monitor	3	30%	5	31.3%	2	22%	6	35.3%	2	50%	3	23%
Motivator	4	40%	2	12.5%	1	11%	3	17.7%	2	50%	3	23%
Learning counselor	1	10%	1	6.3%	2	22%	3	17.7%	0	0	2	15.4%
Content adviser	0	0	2	12.5%	1	11%	2	11.8%	0	0	2	15.4%
Resource provider	0	0	2	12.5%	0	0	0	0	0	0	2	15.4%
Multiple roles	2	20%	4	25%	3	33%	3	17.8%	0	0	1	7.7%
Total	10	100%	16	100%	9	100%	17	100%	4	100%	13	100%

Parent education level spans all education columns.

Note. The percentages represent the percentage within each category and not of the entire sample. For example, of all parents who completed graduate school, 23% scored highest in the monitor category.

Descriptive and categorical responses. The next few pages are a discussion of comparisons that were made to analyze the descriptive and categorical responses from the questionnaire. The goal was to find similarities and differences in responses when parents were sorted by different characteristics to better understand how parents describe their roles within the online mathematics course and to look for patterns in responses within groups.

Communication and helping with the mathematics course. The focus of this section is on the responses to the questionnaire items pertaining to the frequency of parent-learner interactions regarding the online mathematics course. There were 78 responses, from 70 parents, to each of the questions, “How often do you ask your child about math?” and “How often do you help your child with math?” For parents with multiple children in an online mathematics program, these questions were repeated for each subsequent child, hence the number of responses exceeds the number of parents.

Using Qualtrics, I ran a cross-tabulation report to compare the frequency of participant parents asking their child about the mathematics course and helping their child with mathematics with demographic and background information about the parent and child. Nine different columns (banners) were created to look for patterns in responses within and between nine sub-populations:

1. Length of enrollment in the online course,
2. Whether or not the child has an Individualized Education Program (IEP),
3. Whether or not the child has a 504 plan,
4. Whether or not the child has been identified as gifted,
5. Highest education level of the parent,
6. Household income,
7. Relationship of the parent to the child, and
8. Race/ethnicity of the parent.

Length of enrollment in the online course. Parents were asked to indicate the length of time the child has been enrolled in an online mathematics course. The answer choices were: less than 1 month, 1-3 months, 3-6 months, 6-9 months, 9-12 months, 1-2 years, or 2 years or more. Seventy parents responded to this question. No relative patterns emerged when the answer choices were sorted by the length of time the student had been enrolled in the mathematics course.

Whether or not the child has an Individualized Education Program (IEP). Seventy parents indicated that their child has an Individualized Education Program (IEP), receiving special education services for a documented disability. Parents' responses were sorted into three groups: (a) parents of children with an IEP, (b) parents of children without an IEP, and (c) parents who were unsure whether or not their child has an IEP. Developing an IEP involves the approval and participation of the parent, therefore those children whose parents stated that they were unsure whether or not their child has an IEP most likely do not have an IEP. However, so as not to distort the data, their answers were not merged together with any other group.

Within this study, parents of children with an IEP reported asking their children about the mathematics course less frequently than parents of children without an IEP. As reported in Table 9, 63% of parents of children with an IEP reported asking their child about the mathematics course at least once per week compared to 93% parents of students without an IEP. Furthermore, 50% of parents of children with an IEP reported helping their child with mathematics at least once per week, compared to 34% of parents without an IEP.

Table 9
Talking to Students about Mathematics Course, IEP vs no-IEP

	With IEP	Without IEP
Daily	25%	44%
Daily or Multiple times per week	33%	71%
At least once per week	63%	93%

Whether or not the child has a 504 plan. Responses were sorted into three groups: (a) parents of children with a 504 plan, (b) parents of children without a 504 plan, and (c) parents who were unsure whether or not their child has a 504 plan. Seventy parents responded to this question. In both groups, parents of students with and without a 504 plan, 88% reported asking their children about mathematics at least once per week. However, parents of students with a 504 plan were almost twice as likely to report helping their children with the mathematics content at least once per week.

- 63% of parents of students with a 504 plan reported helping with mathematics at least once per week.
- 32% of parents of students without a 504 plan reported helping with mathematics at least once per week.

Whether or not the child has been identified as gifted. Responses were sorted into three groups: (a) parents of children identified as gifted, (b) parents of children not identified as gifted, and (c) parents who were unsure whether or not their child has been identified as gifted. Seventy parents responded to this question. Parents of children who have been identified as gifted were more likely to report asking their child about the mathematics course at a greater frequency than parents of students not identified as gifted. However, parents of students not identified as gifted reported helping their children with the actual mathematics content more frequently than parents of students identified as gifted.

- 77% of parents of children identified as gifted reported asking about the mathematics course daily or multiple times each week.
- 91% of parents of children identified as gifted reported asking about the mathematics course at least once per week.
- 22% of parents of children identified as gifted reported helping with mathematics course at least once per week.

- 64% of parents of children not identified as gifted reported asking about the mathematics course daily or multiple times each week.
- 84% of parents of children not identified as gifted reported asking about the mathematics course at least once per week.
- 40% of parents of children not identified as gifted reported helping with mathematics course at least once per week.

Highest education level of the parent. Within the online questionnaire, 69 parents indicated their highest level of education. All parents reported having at least graduated high school, therefore the answer options pertaining to specific high school grade levels were disregarded during data analysis. The relevant education levels were: graduated from high school, some college, associate's degree, bachelor's degree, some graduate school, and completed graduate school. When sorted by the education level of the parent, no compelling patterns or differences emerged in response to the questions pertaining to asking about and helping children with their mathematics course.

Household income. Sixty-four parents indicated their household income level, choosing between: (a) $0-$24,999, (b) $25,000-$49,999, (c) $50,000-$74,999, (d) $75,000-$99,999, (e) $100,000-$124,999, (f) $125,000-149,999, or (g) $150,000 and up. The number of parents in each group was too small to draw any conclusions. Therefore, for purposes of data analysis, the groups were merged to form just four groups: (a) $0-$49,999, (b) 50,000-$99,999, (c) $100,000-$149,999, and (d) $150,000 and up. The biggest difference that emerged between the groups is that parents with household income levels of $150,000 and up reported asking their children about the mathematics course less frequently than other parents, as reported in Table 10.

Table 10
Talking to Students about Mathematics Course, Household Income

	Household income level			
	$0 - $49,999	$50k - $99,999	$100k - $149,999	$150,000 and up
Daily	60%	30%	55%	9%
Daily or Multiple times per week	90%	60%	80%	27%
At least once per week	90%	82%	95%	72%

Relationship of the participant to the child. Seventy questionnaire participants reported their relationship to the student, see Figure 9. It is important to note that throughout this research study, the term parent refers to any parent, caregiver, or guardian who is the primary support person for a student taking an online course (Waters, Menchaca, & Borup, 2014).

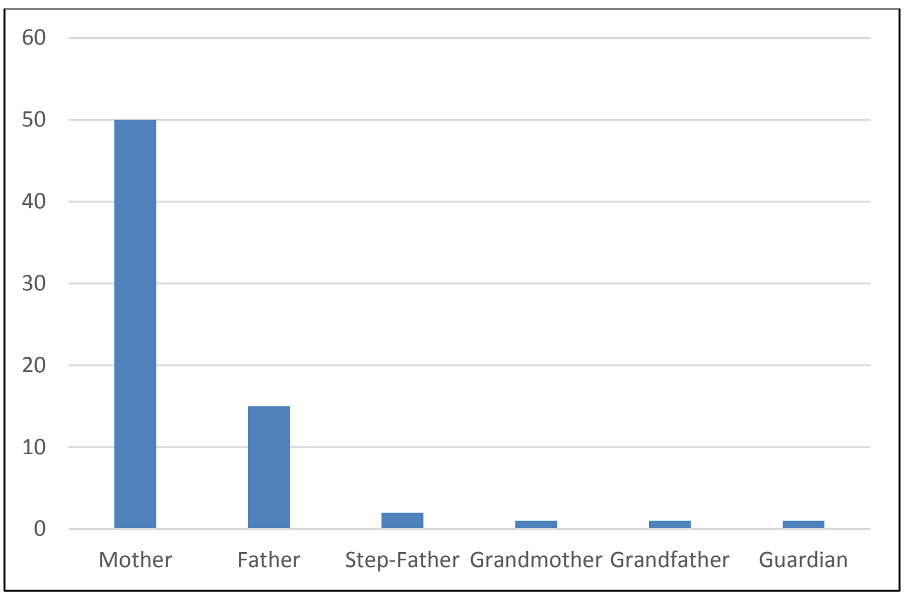

Figure 9. A count of each questionnaire participant's relationship to the child.

Responses to the questions pertaining to asking about and helping children with their mathematics course were sorted to look for similarities within and differences between different relationships. Data analysis revealed that mothers reported talking to children about the mathematics course more frequently than fathers. Mothers were also slightly more likely than fathers to report helping with the mathematics content at least once per week. Grandparents and guardians reported interacting with the child, in regards to the mathematics course, much less frequently than mothers and fathers.

- 82% of mothers reported asking about the mathematics course daily or multiple times each week.
- 27% of fathers reported asking about the mathematics course daily or multiple times each week.
- 40% of mothers reported helping with the mathematics course at least once per week.
- 31% of fathers reported helping with the mathematics course at least once per week.
- 28% of mothers reported never helping their child with math.
- 47% of fathers reported never helping their child with math.

Race/ethnicity of the parent. Responses to the questions pertaining to asking about and helping children with their mathematics course were sorted to look for similarities within and differences between different races/ethnicities. Sixty-seven parents responded to the questionnaire item identifying their race/ethnicity. Figure 10 is an illustrative summary of the ethnicities of the parents who responded to the online questionnaire.

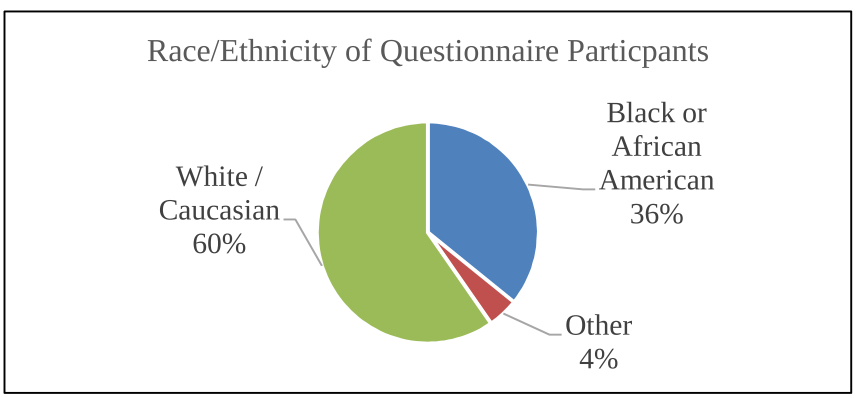

Figure 10. Race/ethnicity of the parents who responded to the questionnaire.

Table 11 summarizes information from parents regarding asking about and helping with mathematics when sorted by race/ethnicity. There were no impressive differences in responses from parents in different ethnic groups pertaining to how often they ask their children about the mathematics course. However, parents who identified as black were more likely than parents who identified as white to report helping their children with mathematics at least once per week.

Table 11

Asking About and Helping with the Mathematics Course, Sorted by Ethnicity

		Race/Ethnicity		
		White	Black	Other
Ask	Daily or Multiple times per week	65%	68%	100%
	At least once per week	90%	80%	100%
Help	At least once per week	20%	52%	100%

Perceptions of success in the online mathematics course. Consistent with symbolic interactionism framework, parents were asked to describe their own definition of success in an online mathematics course. Next, they were asked whether or not they perceived their child as successful in the online mathematics course, based on their own definition of success. Sixty-nine parents provided written descriptions of their definition of success in an online mathematics course. Analysis of the written descriptions is described in the following section. To compare the responses within and between parents, I sorted the responses to the question regarding their perception of their child's success into three groups: Yes, No, and Maybe/Unsure. Table 12 is a sample of several comments that fell within each category. Labeling each response as either yes, no, or maybe/unsure made it possible to treat the responses as categorical and then compare responses between different sub-groups such as: gender, see Table 13; race, see Table 14; household income level, see Table 15; whether or not the child has an IEP, see Table 16; whether or not the child has a 504 plan, see Table 17; whether or not the child has been identified as gifted, see Table 18; and sorted by Parental Involvement Questionnaire (PIQ) role, Table 19.

Table 12
Parents' Report of Success in the Online Mathematics Course

Yes	No	Maybe/Unsure
"Yes, my child is both challenged and successful in her course" (Parent 24, questionnaire).	"I do not think she is learning the concepts to help when taking higher level math courses" (Parent 70, questionnaire).	"He has not yet reached his potential but I trust he will reach it" (Parent 35, questionnaire).
"Yes he does good but could do a little better if he put forth more effort. Good is ok for him" (Parent 42, questionnaire).	"No, I don't feel she is. Unfortunately I feel that the problem occurred way before the on line class. She missed the basics from middle school til now" (Parent 67, questionnaire).	"So, so… Do I think online math course has the potential to be very successful? Yes, if they have an excellent math product" (Parent 17, questionnaire).
"He's learning more than he did in school" (Parent 13, questionnaire).	"I feel like he could be doing better" (Parent 6, questionnaire).	"Barely" (Parent 11, questionnaire).
"Yes...he is making A's and that is our definition of success" (Parent 28, questionnaire).	"He lags behind and depends a lot on extra support through peer tutoring. He is not as successful as he could be if he would depend a little more on the instructional support provided" (Parent 58, questionnaire).	"Unable to determine his success at this time" (Parent 44, questionnaire).
"Very success[ful]! She's enjoying learning in a very positive attitude" (Parent 33, questionnaire).	"He is not being as successful as I think he can be. He runs away from a challenge" (Parent 71, questionnaire).	"It is too early to tell as he has only been in it for 3 weeks" (Parent 59, questionnaire).
"She has performed better online than in the classroom" (Parent 51, questionnaire).		"She just started but she is excited and ambitious" (Parent 7, questionnaire).

When sorted into these various groups, the majority of participant parents reported that their child is successful in the online mathematics course. However, there are two categories in which the majority of parents did not report success: (a) parents of students with an IEP, and (b) parents who scored highest in the PIQ role of motivator. Six parents of children with an IEP answered the question about success; five reported definitively that their child is not being successful and one reported that she was unsure, see Table 16.

When sorted by PIQ parental role, a few interesting trends emerged. First, all groups had a majority of parents report success in the mathematics course except those in the motivator group. Only 42% of parents in the motivator group reported that their child is successful in the online course. Second, two groups reported higher rates of perceived success than the others: (a) parents as content adviser, and (b) parents as learning counselor, see Table 19.

Table 13
Report of Success in Online Mathematics Course, Sorted by Gender

Successful?	Female		Male		Total	
	n	%	n	%	n	%
Yes	22	63%	19	61%	41	62%
No	9	26%	5	16%	14	21%
Maybe/unsure	4	11%	7	23%	11	17%
Total	35	100%	31	100%	66	100%

Table 14
Report of Success in Online Mathematics Course, Sorted by Race

Successful?	White / Caucasian		Black or African American		Other		Unanswered	
	n	%	n	%	n	%	n	%
Yes	28	68 %	11	52%	2	67%	0	0%
No	6	15%	6	29%	0	0%	2	100%
Maybe/unsure	7	17%	4	19%	0	0%	0	0%
Total	41	100%	21	100%	3	100%	2	100%

Table 15
Report of Success in Online Mathematics Course, Sorted by Household Income

Successful?	$0 - $49,999		$50k - $99,999		$100k - $149,999		$150,000 and up		Unanswered	
	n	%	n	%	n	%	n	%	n	%
Yes	7	78%	11	58%	12	67%	8	62%	3	43%
No	1	11%	5	26%	3	17%	2	15%	3	43%
Maybe/unsure	1	11%	3	16%	3	17%	3	23%	1	14%
Total	9	100%	19	100%	18	100%	13	100%	7	100%

Table 16
Report of Success in Online Mathematics Course, Sorted by IEP

	Student has IEP		No IEP		Unsure about IEP	
Successful?	n	%	n	%	n	%
Yes	0	0%	35	73%	6	50%
No	5	83%	5	10%	4	33%
Maybe/unsure	1	17%	8	17%	2	17%
Total	6	100%	48	100%	12	100%

Table 17
Report of Success in Online Mathematics Course, Sorted by 504

	Student has 504		No 504		Unsure about 504	
Successful?	n	%	n	%	n	%
Yes	3	50%	26	63%	12	63%
No	2	33%	7	17%	5	26%
Maybe/unsure	1	17%	8	20%	2	11%
Total	6	100%	41	100%	19	100%

Table 18
Report of Success in Online Mathematics Course, Sorted by Gifted

	Gifted		Not Gifted		Unsure	
Successful?	n	%	n	%	n	%
Yes	15	71%	25	58%	1	50%
No	3	14%	10	23%	1	50%
Maybe/unsure	3	14%	8	19%	0	0
Total	21	100%	43	100%	2	100%

Table 19
Report of Success in Online Mathematics Course, Sorted by PIQ Role

	Monitor		Content Adviser		Motivator		Resource Provider		Learning Counselor		Multiple Roles	
Successful?	n	%	n	%	n	%	n	%	n	%	n	%
Yes	9	50%	6	86%	5	42%	2	50%	8	89%	11	69%
No	5	28%	1	14%	6	50%	0	0%	1	11%	1	6%
Maybe/unsure	4	22%	0	0%	1	8%	2	50%	0	0%	4	25%
Total	18	100%	7	100%	12	100%	4	100%	9	100%	16	100%

Analyzing Open-Ended Responses and Interviews

Coding the data. The first step in the coding process occurs when the researcher initially engages with the data. In this research study, that first step occurred as I read the over 550 written responses to the open-ended questionnaire items and as I transcribed the six interview recordings.

Questionnaire responses. The questionnaire contained nine open-ended items:

1. Why did you choose to enroll your child in an online mathematics class?
2. How do you define success in an online mathematics class?

3. Based on your definition of success, is your child successful in the online mathematics course? Please be specific.
4. How is parenting in a traditional mathematics course different from parenting in an online mathematics course?
5. How is parenting in a traditional mathematics course the same as parenting in an online mathematics course?
6. In regards to your child's mathematics class, what are your expectations of the school?
7. In regards to your child's mathematics class, what are your expectations of the teacher?
8. In regards to your child's mathematics class, what are your expectations of your child?
9. In regards to your child's mathematics class, what do you feel are your responsibilities as the parent?

The qualitative, written responses were initially coded in Microsoft Excel. I added a column to the right of each open-ended question in order to type notes as I read the responses. Simultaneously, I kept a list of the codes in a journal. This helped me see emerging codes, however I quickly realized this would not be an efficient way to condense and compare codes in later phases of analysis. Therefore, in Qualtrics, I exported the responses to each open-ended question as separate .pdf files. I was then able to import the .pdf files into NVivo.

Interview responses. The six interviews were transcribed verbatim using transcribe.wreally.com, a software program that manipulates the keyboard commands to act much like a foot pedal. As I read the questionnaire responses and listened and transcribed the interviews, I made notes of common themes and codes that seemed to emerge. The second step of the coding process is for the researcher to review his or her notes from step one and create a list of pre-codes, which I did after transcribing all of the interviews (Saldana, 2013). Guided by the major tenets of symbolic interactionism, I compared my notes regarding the questionnaire responses and interviews, paying particular attention to commonalities. The result was a list of 51 pre-codes (see Figure 11).

1-on-1 help	Effort (student)	Parent good at math
Applying math	Flexibility (time)	Parent involvement decreased
Bullying	Good grades	Parent involvement increased
Challenge/Rigor	Graduation requirements	Parent learning math alongside
Communicating for help	Hands on experiences	Parent teaching math
Communication from the school	Harder	Parent weak in math
Communication: parent to student	Homeschool	Passing
Communication: Parent to teacher	Increased help from teacher	Past struggles with math
Communication: student to parent	Individualized attention	Positive emotions
Communication: student to teacher	Learning styles	Preparation for college
Communication: Teacher to parent	Learning/understanding math	Student initiated
Communication: Teacher to student	Math anxiety	Teacher feedback
Content standards	Medical	Teacher proximity
Counsellor recommendation	Monitoring	Teacher reputation
Credit recovery	Not different	Teacher support
Disruptive classroom	Pace	Time management
Easier	Parent coaching learning	Time spent working on math

Figure 11. Pre-codes that emerged as a result of step two in the coding process.

From codes to categories. The third step of the coding process is to code the qualitative data using the pre-codes, understanding that new codes might also emerge. First, this required importing everything into NVivo. Once all the sources were imported, I read and coded each transcribed interview. I also coded the results of the nine open-ended questionnaire items. I ran word frequency queries to look for ideas I might have missed during the initial readings. This process resulted in almost 120 codes, or nodes as they are called in NVivo.

Next, the data and codes were regrouped to look for categories, which is the fourth step in the coding process. The codes were sorted into three categories, with some codes spanning across multiple categories.

1. Reasons for switching to the online mathematics course.
2. Parents' expectations of students, teachers, and the school.
3. Parents' roles and responsibilities.

The fifth step in the coding process is to refine the codes based on additional readings of the data. According to Saldana (2012), "codes may be later subsumed by other codes, relabeled, or dropped all together" (p. 10). Codes with similar meanings were merged while codes that did not address the guiding research questions were deleted. The remaining codes were sorted based on similar characteristics. Figure 12 presents a list of the 17 categories that emerged as a result of the refining process.

Access to resources	Good grades	Quality curriculum
Challenge	Identify student needs	Teacher accessibility
Communication	Instructional support	Teacher approachability
Distractions in the classroom	Learning for understanding	Teacher effectiveness
Effort	Monitor	Time management
Good at math	Negative social environment	

*Figure 12. S*eventeen categories emerged as a result of a process of refining the codes.

From categories to concepts and themes. The 17 most important and relevant codes were sorted once again, by category, and grouped based on shared characteristics (Saldana, 2012). Following this process, four concepts and nine themes emerged, as shown in Table 20.

Table 20

Moving From Categories to Concepts and Themes

Concepts	Categories	Themes
Reasons for switching to the online mathematics course.	Distractions in the classroom Negative social environment Time management	Parents enroll their children in online mathematics courses to remove their child from a negative social environment and to avoid the distractions that occur in the traditional classroom setting.
	Challenge Time management Distractions in the classroom	Parents want their children to have the flexibility to work ahead of their peers.
Parents' expectations of teachers and the school.	Quality curriculum Access to resources Communication	The school should provide a quality curriculum and necessary resources for teachers, students, and parents.
	Identify student needs Communication Instructional support Teacher effectiveness Access to resources	Teachers should identify when a student needs help, communicate that need to the parent, and effectively address the need directly with the student.
	Teacher accessibility Teacher approachability Teacher effectiveness Communication	Teachers should be available and approachable.
Parents' expectations of their children.	Effort Time management Learning for understanding Good grades	Students should put forth their best effort to understand the material and earn good grades.
	Identify student needs Communication Learning for understanding	Students should ask for help when they experience difficulty understanding a new concept.
Parents' roles and responsibilities.	Monitor Access to reports Time management	Parents monitor to make sure their children are completing assignments and reaching out for help when needed.
	Identify student needs Instructional support Communication Access to resources	Parents help their children by re-teaching mathematics concepts themselves or encouraging the child to seek help from the teacher.

Emerging Themes

As a result of the process of data analysis, nine themes emerged in relation to participant parents' reasons for enrolling their children in online mathematics courses, parents' expectations of online mathematics courses, and parents' roles and responsibilities in online mathematics courses. These themes emerged from the aggregate of all data collected (questionnaires and interviews).

Reasons for Switching to the Online Mathematics Course:

1. Parents who participated in this study enrolled their children in online mathematics courses to remove their child from a negative social environment and to avoid the distractions that occur in the traditional classroom setting.
2. Parents who participated in this study want their children to have the flexibility to work ahead of their peers.

Parents’ Expectations of Teachers and the School:

3. The school should provide a quality curriculum and necessary resources for teachers, students, and parents.
4. Teachers should identify when a student needs help, communicate that need to the parent, and effectively address the need directly with the student.
5. Teachers should be available and approachable.

Parents' Expectations of their Children:

6. Students should put forth their best effort to understand the material and earn good grades.
7. Students should ask for help when they experience difficulty understanding a new concept.

Parents’ Roles and Responsibilities:

8. Parents who participated in this study monitor to make sure their children are completing assignments and reaching out for help when needed.
9. Parents who participated in this study help their children by re-teaching mathematics concepts themselves or encouraging the child to seek help from the teacher.

Reasons for Switching to the Online Mathematics Course

In response to why he chose to enroll his child in an online mathematics course, one father's statement captures the essence of what many others wrote in the questionnaire:

> Some of it's societal in terms in a rough neighborhood, however you want to put that. The environment [in the public school] wasn't ideal in our opinion. The other side was the flexibility to handle learning at your own pace and moving ahead or getting extra help if you needed. The large classroom with one teacher gets hamstrung with having to try to deal with everybody. (D.B., personal communication, February 2, 2016)

This research study revealed that D.B. is not alone in his desire for a more positive social environment and a classroom free of distractions for his child. In response to the questionnaire item, "Why did you choose to enroll your child in an online mathematics class?" more than 40% of parents expressed the desire to remove their child from a negative social environment and to avoid the distractions that occur in the traditional classroom setting.

Theme 1: Parents who participated in this study enrolled their children in online mathematics courses to remove their child from a negative social environment and to avoid the distractions that occur in the traditional classroom setting.

Negative social environment. A common theme that emerged when participants expressed their rationale for switching into an online mathematics course was the desire to remove their child from the perceived negative environment of the traditional school setting. This desire was generalized to the learning experience as a whole and did not necessarily pertain solely to the mathematics course. Parents' comments included:

- "Bullying/social issues at school." (Parent 8, questionnaire).
- "To keep my child away from all the Drama at school." (Parent 21, questionnaire).

- “He was having problems with the other kids in his school.” (Parent 27, questionnaire).
- “…to remove him from what we perceived to be an undesirable public school situation.” (Parent 41, questionnaire).
- “She was having social difficulties at the regular school.” (Parent 63, questionnaire).
- “She could not deal with the social situations all day long at the public high school.” (Parent 66, questionnaire).

During an interview, one parent described why he and his wife switched their son into an online mathematics course:

> We felt it best that he spend as little time in the public school as possible. I hate to say it in that vein, but I mean it was just some of the environments he was in… So, we just felt it was in his best interest to spend as little time around some of the influences that he was hanging around with, just as little as possible. It had nothing to do with the teachers. The two teachers he had there were great. But, it was mainly the influences that he was around. (J.D., personal communication, February 2, 2016)

Distractions in the classroom. Many of the questionnaire responses contained statements alluding to distractions in the traditional classroom. Several of these statements are listed below.

- “Better instruction and less distractions than in a physical classroom” (Parent 12, questionnaire).
- “He learns better at his own pace versus being in a classroom full of distractions” (Parent 28, questionnaire).
- We “chose to do online school due to distractions that were causing him to not succeed as a part of being at school in person” (Parent 5, questionnaire).

- “Just to take all the distraction from the school away, helping her to stay focus in all her school materials. At school students tend to focus more on fashion and other things” (Parent 34, questionnaire).
- “My child learns better in a one on one environment. He does not like disruptive classrooms” (Parent 55 questionnaire).
- “He is a self-motivated and goal oriented learner. He enjoys learning in an environment free of distractions” (Parent 58, questionnaire).
- “He has been distracted in a classroom environment and thought it would be a good idea to give him more peace” (Parent 71, questionnaire).
- “His traditional class had disruptive children. This way he can work at his own pace and get the help he needs in a timely manner” (Parent 59, questionnaire).
- “Not enough individual attention in school, too many uncontrollable distractions” (Parent 60, questionnaire).

In the interviews, parents were asked to describe the perceived distractions in the traditional classroom. Their responses centered on classroom management as well as the idea that misbehavior of other students interrupted the flow of the classroom environment. One parent explained:

> I guess it’s just the day to day overhead of a classroom environment. The announcements of the front office; or whatever teacher’s aid is walking in with this, that, or the other… Especially in math, you’re trying to really concentrate on something that you’re really having to think about, but you’re always getting interrupted.” (D.B., personal communication, February 2, 2016).

Another parent stated, “Sometimes you just have kids that stop other kids from learning. When the teacher has to spend a lot of time reprimanding another kid, and my kid is waiting to learn something, it takes away from the educational experience.” (P.A., personal communication, February 4, 2016). One of the interviewed parents explained how online courses address the issue of distractions in the traditional classroom:

> They [students] have too many other things that distract them. When [students] are on the computer, that is their focus and it is all right in front of you. If you are waiting on something or someone in a classroom setting, it wastes a lot of time. (G.S., personal communication, February 4, 2016).

The idea of time being wasted because of the behavior of other students leads to the next emerging theme in the category of reasons parents in this study enrolled their children in an online mathematics course: flexibility of pace. Many participant parents stated the desire for their child to be able to move on to the next learning task rather than waiting on other students to pay attention or to understand a concept.

Theme 2: Parents who participated in this study want their children to have the flexibility to work ahead of their peers. Sixty-four parents wrote responses to the questionnaire item, “Why did you choose to enroll your child in an online mathematics class?” Parents were clear that they want their children to progress at their own pace without being held back by other students or procedures in the traditional classroom setting. This theme was evident in the response from Parent 22, “…for most children the ability to work ahead is better than being confined to the schedule based on other students in the class” (questionnaire). In an interview on February 4, 2016, one mother described the situation from her daughter’s perspective, “She does not like to waste time, you know, waiting on other things in the classroom setting. She can move at her on pace [in an online course]" (G.S., personal communication).

In fact, about 25% of all responses regarding why parents chose to enroll their child in an online mathematics course included mention of distractions in the traditional classroom and the ability of their child to move on. Below are a few comments directly from the questionnaire responses.

- "He learns better at his own pace versus being in a classroom full of distractions" (Parent 28, questionnaire).
- "His traditional class had disruptive children. This way he can work at his own pace and get the help he needs in a timely manner" (Parent 59, questionnaire).
- "Highly self-motivated. Independent worker. Resourceful. Doesn't waste time. Can move on when ready" (Parent 50, questionnaire).
- "Our daughter is much happier learning at her own pace and time, therefore she is more positive about her work load" (Parent 74, questionnaire).

One mother talked about her daughter's inability to move on despite finishing her classroom assignments more quickly than those around her:

> My 9th grader is a gifted student and our experience was that at the [traditional] high school that she was attending, everybody was going at the same pace, doing the same stuff at the same time. She wasn't really getting the acceleration I wanted her to have. She was basically sitting in class and she would ask the teacher, after she finished her work, if she could work onto something else and he basically told her no. (C.D., personal communication, February 8, 2016)

Other participant parents noted the flexibility of being able to set their own schedules during the week and having the option to complete a lot of work over a few days and then not working at all for a few days. As stated by a parent on the questionnaire, “The ability to work ahead is better than being confined to the schedule based on other students in the class” (Parent 22, questionnaire). In an interview, one father said this about his son, who is a senior running his own business and preparing to graduate in the spring:

> He can work at his own pace in the online [class]. We have been through enough semesters now [in online courses] to understand that he is a bulk worker. So, he does bulk assignments and knocks out tons of assignments in a 2 or 3 day period. He gets 30%-40% done in a class, in a very short period of time. But that's how he has learned. He gets easily distracted, but once he gets focused he will get it done.” (J.D., personal communication, February 2, 2016)

A different parent said this about why she switched her daughter into an online mathematics course:

> She can work at her on pace. She is very independent, very self-motivated. She's an only child. So she is used to, with two working parents, not a lot of supervision. Which is not a good thing for some but, with her, she is very self-driven and we don't have to keep on her a lot of times to get things done, and it seems to work out… It probably doesn't work out for a lot of kids because you do have to have a lot of self-discipline. (G.S., personal communication, February 4, 2016)

Participant parents also indicated that online courses offer students the flexibility to advance grade levels more quickly than in the traditional setting. One parent shared that a motivating factor for switching into an online mathematics course was “…her [the student] being able to advance in her studies and advance in her grade level because of the flexibility" (P.A., personal communication, February 4, 2016). Other parents explained that their children were planning to complete more than one grade level over the course of a single school year. For example, one parent wrote that the reason her daughter switched to online mathematics courses is because "She is in advanced studies and she is trying to finish 10th and 11th grade in the same year!!" (Parent 7, questionnaire).

Parents' Expectations of Teachers and the School

Participant parents were asked to describe their expectations of the school and the teacher in an online mathematics course. The questionnaire yielded 118 written responses from 59 different parents. A frequent response to both items was "to help my child succeed". Questionnaire and interview responses were analyzed in an effort to better understand what participants meant by *help* and *succeed*. As a result of this exploration, an understanding of success in the mathematics course emerged, as well as themes three and four.

Defining success in an online mathematics course. To better understand the direction that helping a student should take, one must first understand what the end goal, or success, looks like. Therefore, parents were asked to define success in an online mathematics course. Of the 71 questionnaire participants who wrote a definition of success in the online mathematics course, almost all focused on one or more of the following three concepts: passing, or making good grades; understanding the mathematics concepts; and effort of the student. A query using NVivo software revealed that *grade* and *understanding* were the two most frequently used words in response to the questionnaire item, "How do you define success in an online mathematics class?" Other interesting similarities emerged, including:

- 51% of parents emphasized the importance of passing, or making good grades.

    - 28 parents gave responses such as “Passing”, “B or higher”, or “Making an acceptable grade” (questionnaire responses).
- 44% of parents emphasized the importance of understanding the mathematical concepts so they could apply them in future situations including college, career, and life experiences.
    - “Understanding the concepts and knowing that each concept builds upon the last as you progress through high school” (Parent 5, questionnaire).
- 24% of parents emphasized the effort of the child and time spent working on the course.
    - “Success is measured on how much effort and hard work is put into the online class” (Parent 9, questionnaire).
    - “By the amount of time the students spend online with the subject” (Parent 21, questionnaire).

Theme 3: The school should provide a quality curriculum and necessary resources for teachers, students, and parents. Participating parents expect the school to provide a mathematics program that will lead children towards understanding mathematical concepts in order for them to apply them in future situations including college, career, and life experiences. This theme addresses several concepts including: (a) quality curriculum, (b) access to resources, and (c) communication.

Quality curriculum. Parents who participated in this study expect quality curriculum to be provided by the online school administrators. Parents described quality curriculum as that which covers the same topics as would be taught in the traditional school with at least the same level of rigor. Parents expect children to learn concepts “similar to what she would be learning at her core [traditional] school" (Parent 17, questionnaire, January, 2016). Participant parents expect the school to:

- "…make sure the online courses maintain the same rigor as in school classes" (Parent 69, questionnaire).
- "…provide course work at an appropriate level that competes with other high schools and prepares them for college" (Parent 29, questionnaire).
- "…offer sufficient practice, resources, and instruction in order to understand the topic" (Parent 38, questionnaire).

The learning platform, or tool that is used to organize and deliver this curriculum is also important. Parents expect school leaders to, "evaluate online courses for appropriateness (including student and parent feedback) instead of picking the "latest and greatest" trend (or the cheapest)" (Parent 41, questionnaire).

Access to resources. Many of the participant parents referenced the value of resources that are not built directly into the online learning management system such as textbooks, online videos, and websites with textual explanations. Questionnaire and interview participants frequently described using these resources to directly help their children learn math. They also talked about how their children use these resources to independently learn math. The use of outside resources to support students in their mathematics course was mentioned more frequently than any other strategy including going to the school for face-to-face help or participating in webinars with the teacher. Parents in this study expressed the desire for the school to provide students, parents, and teachers with access to these resources as well as to provide training and support to the parent on how to effectively use these resources to support their children at home.

Communication. Parent participants expressed an expectation that the school communicate with parents about opportunities to support their child, including how they can directly help their child at home. When asked how the teachers and administrators at Online Academy can better support the parents, one interviewee described something that other parents also mentioned in the questionnaire responses. Parents need reassurance that they are capable of supporting their children in their studies.

> There are a lot of parents that are out of their comfort zone when it comes to the math. I know there are several of my friends that never would be able to sit down and help their student with it. But, with on-line learning, it's easy because you can watch the lesson with them… We can see exactly how they are being taught to do something. So, it is about reminding the parents that they have the ability to help even if they think they can't. (M.B., personal communication, February 4, 2016)

When asked about methods of communication, most parents agreed that emails should be the primary means of communication and that phone calls should be made for more personal or immediate issues. Though the school has an active Facebook page, not one questionnaire or interview participant mentioned using social media to receive information or communicate with the school and teachers. One parent even elaborated on the importance of email communication:

> In modern society, everyone wants to [say] oh, we'll use Facebook, or we'll use Twitter, or we'll use... If you want to span them across all of them, that's fine with me, but you've got to make sure you hit the common denominator. If somebody has an online class, they probably have email. And access to it. (D.B., personal communication, February 2, 2016)

In summary, participant parents expect the school to provide a quality curriculum along with the necessary external support and resources to ensure the student will understand the material and pass the class. Participant parents also expect the school to effectively communicate these resources and opportunities to the parents and students.

Theme 4: Teachers should identify when a student needs help, communicate that need to the parent, and effectively address the need directly with the student.

Identifying and communicating student needs. Parents who participated in this study expect teachers to identify when a student needs help and contact the parent. An NVivo word frequency query of the responses to the questionnaire item, "In regards to your child's mathematics class, what are your expectations of the teacher?" revealed the most frequently used words were *help*, *available*, and *needed*.

In order for a teacher to recognize when a student needs help, he or she must be "Knowledgeable about the subject" (Parent 7, questionnaire) and attentive to the needs of the students. When asked about their expectations of the mathematics teachers, parents responded that the teacher should:

- "…let me know if there are issues seen or extra help is needed so I can assist or make sure he comes in for that help" (Parent 5, questionnaire).
- "…pay attention to my child's strength and weaknesses and get together with my family to help my child identify what needs to be done" (Parent 57, questionnaire).
- "…be available to both the Learner and the parent to answer specific questions, encourage strategies for learning, and to inform me as the parent of how I can help at home" (Parent 62, questionnaire).
- "…identify if tutoring is needed" (Parent 31, questionnaire).

After recognizing a student’s need for help, and communicating that need to the parent, teachers are expected to address that need by working with the student and providing the necessary instructional support.

Effectively addressing student needs. Participant parents expect teachers to effectively address student needs directly with the child. One parent explained this as his expectation for the teacher “To have the ability to explain and teach clearly, so my son can understand and be confident in his math.” (Parent 15, questionnaire). Parents expect teachers to:

- “…teach math in a way that is understandable, relevant and fun” (Parent 29, questionnaire).
- “…offer alternative explanations and /or resources for explanation if needed. I expect the teacher to also help with plans to stay on track or catch up if needed” (Parent 38, questionnaire).
- “Present the material in an engaging manner, with adequate explanations and alternative explanations - sometimes one manner of explaining an issue doesn't "click" with a student, while another explanation will be immediately obvious. Providing one-on-one assistance if required” (Parent 42, questionnaire).

Theme 5: Teachers should be available and approachable. In their written responses to the questionnaire item regarding expectations of the mathematics teachers, participants expressed an expectation that teachers are available during the school day and that they are approachable, or welcoming to the students. Below are responses from parents regarding their expectations of the teachers in the online mathematics courses:

- “I expect the teacher to be accessible. If my child (or myself) reaches out to the teacher, I expect a response in a reasonable amount of time” (Parent 38, questionnaire).
- “To be available during school hours, but they usually go beyond” (Parent 34, questionnaire).
- “I expect the teacher to be approachable, and able to explain math to my child so that she can understand it when she does not” (Parent 66, questionnaire).
- “That she is available and able to explain things he doesn't understand” (Parent 68, questionnaire).
- “Good instruction as well as being open and available when my [child] has questions” (Parent 44, questionnaire).
- “That they patiently help” (Parent 36, questionnaire).
- “To respond when requested in a timely manner” (Parent 8, questionnaire)
- “To continue to make themselves available and alert the child and parent when they see a problem (Parent 11, questionnaire).
- “Communication and availability” (Parent 52, questionnaire).
- “Be available for help when needed. Reach out to student and parent if there is a concern” (Parent 46, questionnaire).

Parents' Expectations of their Children

Using NVivo software, a word frequency query of the responses to the questionnaire item, “In regards to your child’s mathematics class, what are your expectations of your child?” revealed the two most frequently used words were *best* and *help*, as in “To do her best and ask for help when needed” (Parent 20, questionnaire). The concepts of best effort and asking for help were very prominent. Parents' responses, such as those in the next paragraph, led to the emergence of themes six and seven. Responses to this questionnaire item, "In regards to your child's mathematics class, what are your expectations of your child?" include:

- "I expect my child to complete her work to the best of her ability. I expect her to reach out if she needs help" (Parent 38, questionnaire).
- "Work hard and review all material presented. Pay attention to the material and allot adequate time to the subject. Ask for help from parents or teacher if required. Keep parent abreast of issues so that additional help can be arranged if needed." (Parent 42, questionnaire).
- "That he does what he is supposed to, on time, and do the best work he can. If he needs more help, he needs to make sure he goes into Cafe' to get the help needed" (Parent 5, questionnaire).
- "That she spend the time that is needed for her to stay on pace and that she take her time and if she get stuck on a problem that she will ask the teacher to help understand what she is doing wrong so that she will be able to work the problem out" (Parent 21, questionnaire).

Theme 6: Students should put forth their best effort to understand the material and earn good grades. The theme that students should put forth their best effort to complete assignments in a timely manner, understand the material, and make good grades emerged as a result of analyzing parents' questionnaire responses regarding their expectations of their children as well as how they define success in an online mathematics course. Almost all of the 71 parents who provided their definition of success in an online mathematics course described: passing, or making good grades; understanding the mathematics concepts; or the effort of the student. Below are comments from parents about their expectations of their children in the online mathematics course:

- "To always give their best effort" (Parent 8, questionnaire).
- "To do the best she possibly can" (Parent 18, questionnaire).
- "To put in her best effort" (Parent 25, questionnaire).
- "That he does his best and does not get frustrated when it gets too hard" (Parent 59, questionnaire).
- "Give 100 percent" (Parent 39, questionnaire).
- "He does his best and works hard" (Parent 36, questionnaire).

Some questionnaire participants were more descriptive and expressed the expectation that students put forth effort to understand the mathematics and earn good grades. The term "good grades" is subjective, yet some stated specific letter grade expectations.

- "To do his best and pass the class" (Parent 43, questionnaire).
- "She learn and maintain a high B or an A" (Parent 48, questionnaire).
- "Make A's or B's, learn all you can, ask when you don't understand, think about ways you can apply new knowledge in everyday like or your future career" (Parent 51, questionnaire).
- "I expect my child to perform her very best in every course and to pass with no less than a "b" average" (Parent 24, questionnaire).
- "I expect my child to follow along with assignments and practice work according to it to achieve successful grades on quizzes and tests" (Parent 4, questionnaire).
- "To do his work in a timely manner, to do his best and seek help if needed" (Parent 29, questionnaire).

- "I expect my child to dedicate time to his math class so he can build a deep understanding of the presented math skills" (Parent 69, questionnaire).

Theme 7: Students should ask for help when they experience difficulty understanding a new concept. One prominent theme that emerged from the questionnaire data is the parents' expectation that students seek help with their mathematics course. The word *help* was the second most frequently used word used to describe parents' expectations of their children in the mathematics course. Parent comments that support this theme include:

- "I expect him to ask questions when he doesn't understand. I expect him to take the initiative to seek help from home or school when necessary" (Parent 62, questionnaire).
- "I expect me child to keep up with his assignments and to indicate if he is having trouble learning the material" (Parent 14, questionnaire).
- "Study hard and seek help when needed." (Parent 70, questionnaire).
- "To work hard and ask for help" (Parent 31, questionnaire).
- "To be vocal when she needs assistance" (Parent 34, questionnaire).
- "Staying on top of his assignments and reaching out to the teacher when he doesn't know how to do math problems" (Parent 35, questionnaire).
- "To acknowledge when help is needed for understanding" (Parent 45, questionnaire).
- "He should put time and effort into learning all concepts taught and communicate to the teacher when he needs help" (Parent 58, questionnaire).

Most responses did not specify whether the child should contact the parent or teacher when help is needed. Of those who did specify, most indicated that the student should ask for help from the teacher.

Parents' Roles and Responsibilities

The primary purpose of this research was to understand how parents at Online Academy describe and define their roles and responsibilities as they pertain to their children's online mathematics course. On the questionnaire, parents were asked to write about the similarities and differences between parenting a child in a traditional mathematics course versus parenting a child in an online mathematics course. They were also asked about their perceived roles and responsibilities in the online mathematics course. Participant parents provided over 170 written responses to these items. The idea of parental roles and responsibilities was also discussed during the interviews.

Analysis of both questionnaire and interview responses regarding parental roles and responsibilities revealed several common trends including: monitoring, access to reports, time management, identifying student needs, instructional support, communication, and access to resources. All of these ideas are encompassed in the following parent's reaction to the question, "…what do you feel are your responsibilities as the parent?"

> Monitor grades and progress. Address issues or deficiencies with child. Determine if it is a child issue (not working on subject enough, etc.), or if they need additional assistance. Provide that assistance, either from parent or engaging other resources (online, teacher, etc.). Provide means to have a "face-to-face" with teacher if needed. Ensure that grades are maintained and properly posted to recording systems. (Parent 42, questionnaire)

Further analysis of these categories revealed three themes describing the parents who participated in this study: parents monitor their children, parents help their children directly, and parents arrange outside support for their children.

Theme 8: Parents who participated in this study monitor to make sure their children are completing assignments and reaching out for help when needed. In this study, over 50% of questionnaire participants responded that their job is to monitor progress, making sure their child is doing their work and asking for help when they need it. In fact, about 30% of questionnaire participants used the exact phrase, “to make sure” when they were asked to describe their responsibilities as the parent of a child in an online mathematics course. Theme eight emerged as a result of analyzing both the questionnaire and interview data pertaining to parental involvement in the online mathematics course.

“In one word, I'm a monitor” said C.D. about her role as a parent in an online mathematics course (personal communication, February 8, 2016). Parent 21 explained, “You have to ensure the work is being done and child is taking it seriously because there is no specific class time” (questionnaire). When asked what advice she would give to a parent considering enrolling their child into an online mathematics course, M.B. described her own involvement:

> I would tell them that just like a traditional classroom you have to be involved, and I believe that for either situation. With online it's very easy to stay involved. It's very easy for me to know whether he's ahead or behind, what his grades are. For me, it's much easier that way than it was in a traditional classroom. I can sit down with him. And I think it's important to monitor when they are struggling. And with online you have to be available to answer some of those questions as they come up. I'm not saying that I'm just sitting here all day, I'm not. But, I guess my biggest advice to somebody would be to make sure you are communicating well with your student and that you are checking their grades and activities and progress. (Personal communication, February 4, 2016)

One interview participant went on to discuss the importance of having an adult physically monitoring the child throughout the day. She said, “If you don't have someone at home, it's going to be more difficult to keep up with what they are doing… Even good kids have a hard time making themselves do the right thing and be responsible” (C.D., personal communication, February 8, 2016). This particular parent works full-time, away from the home, but has the children’s grandparents watch them during the day. When asked what advice she might give a parent considering enrolling their child into an online mathematics program, she suggested that parents form a “network so that you know somebody's mom is off on this day, so a couple of them meet over there at that house. Then this person's Dad is off, or whatever.” She went on to say, “… it's not going to be as positive if you are just sitting at home by yourself. Teenagers don't really make themselves do it [schoolwork]” (C.D., personal communication, February 8, 2016).

Below are several excerpts from the questionnaire responses to further support the argument that participant parents feel a strong sense of responsibility to monitor their child’s progress.

- “My responsibility is also to regularly monitor her progress (we have a standing, weekly status update every Monday), assess her strengths and weaknesses and take corrective actions if needed” (Parent 24, questionnaire).
- “To monitor his grade and progress and ensure he is doing what he is supposed to be doing” (Parent 5, questionnaire).
- “It is my responsibility to check my child's progress and talk with my child about his work” (Parent 69, questionnaire).
- “To make sure he is getting his work done and to make sure he is truly learning the concepts that are being taught. To communicate with him effectively so that he will

ask for help or that he will volunteer information on how is progress is going!" (Parent 28, questionnaire).

- "To help guide him and to make sure he is doing his class work" (Parent 27, questionnaire).
- "Stay on him to stick to his schedule rewarding him when he does and punishing him when he sluffs off" (Parent 35, questionnaire).
- "To monitor progress and make sure they stay on task [offer] assistance where I can on problem area" (Parent 4, questionnaire).
- "To make sure she stays on track" (Parent 1, questionnaire).
- "To maintain an open relationship to discuss and monitor their progress" (Parent 8, questionnaire).
- "To inquire about her progress and keep informed of her grades. To get involved if she starts to fall behind" (Parent 74, questionnaire).
- "My responsibility should be to ensure that my child keeps up with the pace of the class and is able to engage online with necessary resources to help them succeed" (Parent 11, questionnaire).
- "To check grades...help [with] progress...ensure she is logging in daily" (Parent 20, questionnaire).
- "To make sure that my child is working every day and that she is taking advantage of the help that is out there, I am to check her work daily and to check with her teacher to see if she is doing ok, making sure that she is passing her class" (Parent 21, questionnaire).

- "Motivation and facilitation of work leading to a passing grade" (Parent 65, questionnaire).
- "To inquire about her progress and keep informed of her grades. To get involved if she starts to fall behind" (Parent 74, questionnaire).

In an interview, J.D. captured the essence of many of these comments when he answered the question, "In one word, how do you describe your role in the online mathematics class?" He answered:

> I guess I am kind of the Assistant Principle in that I'm the one usually asking him how he is doing, staying on top of him, making sure he is getting his school work done... Sometimes just encourage him to get his work done. (J.D., personal communication, February 2, 2016)

Theme 9: Parents who participated in this study help their children by re-teaching mathematics concepts themselves or encouraging the child to seek help from the teacher. When asked to describe their own responsibilities in the online mathematics course, questionnaire participants used the word *help* most frequently. The word *help* was used mostly in one of two contexts: to help their child with the mathematics course; or to make sure their child gets help, whether it be from the parent, teacher, or another resource. Eighty-six percent of questionnaire participants reported asking their child about the mathematics course at least once per week; 35% reported helping at least once per week.

Parents helping with the mathematics course. Questionnaire and interview participants described being very involved in the online mathematics course. When asked, "How is parenting in a traditional mathematics course different from parenting in an online mathematics course?" Parent 25 wrote, "With the traditional course I am not as involved in the learning process" (questionnaire). Another parent expressed that “It [having a child in an online mathematics course] requires that I become the teacher” (Parent 32, questionnaire).

A common theme that emerged from questionnaire and interview responses regarding their own involvement in the online mathematics course was that the parents who participated in this study often review or learn mathematics concepts to improve their own ability to explain the content to their children. Most parents indicated that an advantage of an online mathematics courses is that they can engage in the lessons alongside their children to learn or review the concept and then reteach it to their child. Parent 39 explained, “With an online math course, a parent can also watch the lecture to see how the material is presented in order to help the student if they are struggling. You can watch it unlimited times” (questionnaire). Parent 48 reiterated this point, saying “it is easier to do online because I can watch the lesson. In the [traditional] class I cannot see the teacher” (Parent 48, questionnaire).

Below are responses to the questionnaire item, “How is parenting in a traditional mathematics course different from parenting in an online mathematics course?” that emphasize the roles that parents play in helping their children with the mathematics course.

- “Parenting in an online math course requires more knowledge and effort. The classroom has immediate access to an instructor who can explain further as the lesson is presented, whereas online there is a delay” (Parent 55, questionnaire).
- “I can watch the videos with her so we both get an understanding” (Parent 38, questionnaire).
- “With the online [class] you can view instruction yourself making it easier to help the child” (Parent 40, questionnaire).

- There is greater "…access to more sources to assist with understanding math materials" (Parent 44, questionnaire).
- "We use online resources to help when my son needs to see examples" (Parent 69, questionnaire).

In regards to her own responsibilities in her child's mathematics course, one mother explained, "I am responsible for helping him learn and not memorize the work. He should be able to apply what he has learned to practical situations" (Parent 55, questionnaire). Another mother wrote that her responsibility is "To guide assist and tutor if required so that the child understands the subject matter" (Parent 12, questionnaire).

Questionnaire and interview participants acknowledged that access to reports in the online mathematics course enables them to respond more quickly to their child's needs in the mathematics course. Parent 47 elaborated on this concept:

> It is easier for me to know how a concept is being taught online since I can watch the lesson with him when he has questions. In a traditional course, I have to base it off his notes and a textbook. He seems more willing to ask me for help with an [online] class. In traditional classes, I had to wait for grades to be entered to know if he was struggling, which could be weeks after he took a quiz/test. With online classes, I know immediately if his grade falls and can help quickly. (Parent 47, questionnaire)

In his questionnaire response, Parent 42 explained how the structure of the online content at Online Academy made it harder to help his child, explaining that with the current "style of lecture, it's hard to flip back and "glance over the book" to get that refresher before trying to assist" (questionnaire). He, along with several other parents, suggested that having a tangible resource such as a textbook would help parents more effectively help their children. The underlying theme in the comments about access to resources is that whether or not the parent finds it easier or more difficult to help their child, they are acknowledging that they are in fact helping their children with the mathematics course.

Some parents wrote about helping their children first, then reaching out to the teacher if further help is needed:

- My responsibility in the online mathematics course is “To provide assistance if I do not understand I will email the teacher to let her know the help that [my daughter] needs” (Parent 53, questionnaire).
- “I can watch the videos with the children and help explain it to them. If neither one of us understands we contact the teacher” (Parent 60, questionnaire).

Parents arranging help for their child. Parents who participated in this research study described helping their children with the mathematics course as well as encouraging and arranging help from other resources such as the teacher, online resources, and paid tutors. Parent 66 wrote that her responsibility as the mother of a child in an online mathematics course is “to get help for her if she has a problem that she cannot solve on her own. It is also my responsibility to help her when I can” (questionnaire). Another parent wrote “I do not feel like I should have to hound her, but I do feel it is my responsibility to be aware of her status in the course” (Parent 38, questionnaire). Parent 38 went on to say, “I feel like if she is not doing well, I should push her to seek help or help her to get the assistance she needs” (questionnaire).

When asked to describe how parenting in an online mathematics course is different than parenting in a traditional mathematics course, Parent 18 wrote:

> With online, she will go through her lecture, then take the test. If she missed a couple things on the test, then she will normally reach out to me to see if I can help her

understand it better. If she still doesn't understand it then I always recommend that she reach out to her teacher. (questionnaire)

When describing their own responsibilities in the online mathematics course, participant parents wrote about contacting the teacher to get help for their child.

- “It is my responsibility to get him the support needed. If he needs to go to the school for tutoring then I must get him there. It is my responsibility to keep abreast of his learning needs or struggles” (Parent 58, questionnaire).
- “My responsibilities are to help my child as best I can. Contact the teacher if they are not understanding and then get outside help if necessary. Also, to stay on top of things to make sure they do not get too far behind” (Parent 59, questionnaire).

Parent 58 described how communication with the student and teacher can ensure the appropriate amount of help is being received. In her response to “How is parenting in a traditional mathematics course different from parenting in an online mathematics course?” Parent 58 wrote:

> There isn't much that is different for me. I am not able to do the level of math my child is doing. He has surpassed my understanding. I just ask if he is feeling like he needs help or if he is struggling with the material. He generally says that what he doesn't know his friends teach him. He has received help from the teacher once or twice. I do think that the online communication is much better than that of the teachers in the high school. I have not been aware of his progress through good teacher communication since elementary school. When I have asked his teachers how he is doing I wouldn't get much of an answer. In the online school I am more aware of what he is working on and the teachers are always available to support him. There is more provided by the teacher in online

support materials for his math class in the online format. I really like that his teacher provides webinars and leaves the videos up for future review. (questionnaire)

Parents who participated in this study also wrote about arranging help from private tutors:

- "I must communicate with the teacher and get my son a tutor as we currently have when needed" (Parent 15, questionnaire).
- "Math tends to be a struggle sometimes and in those instances I have set her up with a paid, private tutor or she's received help from her older sibling, or we leverage online resources like Khan Academy" (Parent 25, questionnaire).

Regardless of the method of getting help, a prevalent theme that emerged from this research was the desire of participant parents to help their children be successful in their mathematics course. Parent 25 wrote that her responsibility is, "To help her in any way I can to help her be successful. Make sure she gets the help if she is struggling. To know when she is struggling" (questionnaire).

Limitations

This research study has a number of limitations. One limitation to this study was access to the parents of students in online high school mathematics courses. This study relied on the voluntary participation of parents in interviews and questionnaires. Therefore, the voices of those who did not participate were unable to be heard. Another limitation is my subjectivity to the research. As a high school mathematics teacher at Online Academy, parents might be apprehensive to respond honestly or participate at all.

Access to participants. The first limitation is in regards to the participants. Parents were solicited to participate in the questionnaire and interview via email. This element of the research design relied on the accuracy of the email addresses in the SIS. Problems I likely encountered but cannot actually prove include:

- Email accounts that are no longer activated or checked by the parent,
- Email addresses that were entered incorrectly into the SIS, and
- Emails accounts that are checked by the student, rather than the parent.

Originally, the plan was to only include the invitation to participate in an interview at the end of the questionnaire. The problem with this is that it would have limited the interview pool to only those parents who actually completed the questionnaire. To improve this part of the design, a statement was made in the initial email about participating in an interview. Parents had the opportunity to reply to the email with their contact information if they desired to participate in the interview. This allowed parents to volunteer for an interview without participating in the questionnaire. All of the parents who volunteered to participate in an interview did so via the questionnaire.

A problem still exists with this method of contacting parents via email. Sending the questionnaire and invitation to participate in an interview by email requires that the parent actually check their email, thus filtering out parents who do not read their emails. By filtering out parents who do not regularly check their emails, I expect that I also filtered out parents who are less active in their child's online mathematics course. I determined that 528 emails were sent, at least 11 emails bounced back as undeliverable, and 87 parents started the questionnaire. That means that 430 potential participants were contacted but either didn't read the email or intentionally chose not to respond.

Subjectivity. My subjectivity to this research is that I am currently teaching high school mathematics courses for Online Academy. To mitigate this limitation, I attempted to remain anonymous throughout the questionnaire process by sending the questionnaire link to parents using a university email address rather the email address that would likely be associated with Online Academy.

During the interview phase, I addressed this limitation by reassuring parents that their involvement would in no way affect their child's grades. I introduced myself by first name, rather than with a title such as *Mrs.*, in an effort to set a more casual tone for the interview. I commenced the interviews with simple, non-threatening topics such as the number of children in an online mathematics course or how long the child has been in an online program. I intentionally did not challenge anything said by the parents. Rather, I used verbal encouragement such as "uh huh," and "that's a great point," to motivate the parents to feel comfortable and want to continue talking. During the analysis phase, I tried to not allow my own experiences and expectations to influence the themes that arose from the data. As I reviewed themes that were beginning to emerge I would deliberately reflect on whether these themes were actually emerging from the data or if I was imposing my own ideas onto the data. I would frequently go back to the actual responses of the parents to verify that I had coded appropriately. I attempted to look at the data from the perspective of someone less familiar with the school to ensure that the themes I noticed were the themes that another researcher would discover if they analyzed the same data.

Blumer (1969) describes that a shortfall in most research projects is that the scholar lacks "firsthand acquaintance with the sphere of social life that he proposes to study" (p. 35). As a result, the researcher is "unlikely to recognize that he is missing anything" (Blumer, 1969, p. 37). Fortunately, my relationship to online learning positions me close to the area of study and diminishes this shortfall. I feel comfortable as an observer, striving to make sense of the parents' definitions and interactions. It is through these observations that I strived to answer the research questions in this study and, in general, create an intelligible illustration of parental involvement at Online Academy.

Validity and Reliability Measures

Measures were taken to assure reliability and validity in the research design. Validity is the notion that the research provides, “appropriate and valid evidence for the claims being made” (Prior, 2003, p. 149). Validity of this research was ensured by aligning data collection and analysis to the research questions. Data was triangulated using online questionnaires and follow-up interviews. The 23 Parental Involvement Questionnaire (PIQ) items had a high level of internal consistency, as determined by a Cronbach’s alpha of 0.851. A one-sample 2-tailed t-test of the mean score for each of the five parental involvement categories indicated that there is a statistically significant difference between the PIQ roles’ categories ($p < 0.05$). Thus, the division between categories is statistically justified.

According to Prior (2003), reliability is the concept that findings are “independent of the particular circumstances in which the research was carried out” (p. 149). In other words, if a different researcher were to conduct this study, he or she might derive different, but not contradictory, results (Bogdan & Biklen, 2007). According to Rubin and Rubin (2012), to ensure reliability, or accuracy, it is important to carefully transcribe interviews and reread them when writing up an analysis rather than to rely on memory alone (p. 64). Rubin and Rubin (2012) also emphasize the importance of accurately portraying the parents by choosing quotations that fairly convey their experiences and understanding, rather than selecting quotations that support the researchers preconceived ideas. Analysis is most reliable when, “participants in the research recognize themselves and their world in the portrait you [the researcher] have drawn" (Rubin & Rubin, 2012, p. 65).

It was imperative that parents' own perceptions were received during the interviews. DeWalt and DeWalt (2011) suggest that the interests of the researcher will always have an impact on the conversations, however, "The trick is to use this impact to encourage informants to discuss more fully the topics that relate to the research question, but to direct the content of the conversation as little as possible beyond that" (p. 141). To do this, I jotted notes during the interview and used them to follow-up with questions that would clarify something the parent said so I could validate my interpretation of their words.

Summary

This qualitative exploratory embedded single-case study, bounded by the online program that was studied, was performed in an effort to better understand participant parents' perception of their role in an online high school mathematics courses. Eighty-seven parents participated in an online questionnaire which elicited both quantitative and qualitative responses. These responses were combined with the data from six individual interviews to investigate why participant parents chose to enroll their children in online mathematics courses, their expectations pertaining to the online mathematics course, and their perceived roles and responsibilities in the online mathematics course.

. Four concepts emerged from analysis of the data: reasons for switching to the online mathematics course, parents' expectations of teachers and the school, parents' expectations of their children, and parents' roles and responsibilities in online mathematics courses. The nine themes that emerged from these four concepts provide insight into the realities of the parents in this study as they are engaged in online mathematics courses at Online Academy.

Acknowledging these themes could have a powerful effect on how teachers, administrators, and course designers work to engage parents in the online learning environment. In the following chapter, I discuss the implications of this research for current practice in the field of online learning as well as suggest topics for future research.

CHAPTER 5

Discussions

The purpose of this research was to gain a better understanding of the nature of parental involvement in high school online mathematics courses at Online Academy. A qualitative exploratory embedded single-case design was employed, framed by the major tenets of symbolic interactionism: self-talk, social interaction, and meaning making (Blumer, 1969). To better understand the perceptions of parents at Online Academy, data was collected through online questionnaires and individual interviews. Analysis of qualitative and quantitative data revealed nine themes, answering the three research questions of this study:

1. What are the factors contributing to parents' choice of online mathematics programs over traditional, brick-and-mortar, programs for their children?
2. What are parents' expectations of the program, teachers, and their own children?
3. How do parents define and describe their roles as their children are engaged in learning mathematics through online programs?

The purpose of this chapter is to provide a brief summary of the research, to relate the themes that emerged from data analysis to relevant literature, to discuss implications for current practices in education, and to broach ideas for future research.

Summary

An invitation to participate in this research study was emailed to 528 parents of students in a high school mathematics course at Online Academy (pseudonym). Eighty-seven parents participated in the questionnaire and six participated in an individual interview. The purpose of the questionnaire was to gather background information about the parents of students in Online Academy, to learn more about parental involvement at Online Academy, and to recruit participation in a follow-up interview. The questionnaire solicited a mixture of descriptive narrative, categorical, and open-ended responses; both quantitative and qualitative data. A semi-structured interview style was conducive to allowing the voices of the parents to be heard, consistent with the major tenants of symbolic interactionism.

The questionnaire yielded over 550 open-ended responses pertaining to why parents in this study chose to enroll their child in an online mathematics course, parents' expectations surrounding the online mathematics course, and parents' own roles and responsibilities in the online mathematics course. The questionnaire responses informed the questions asked during the semi-structured interviews. The combined questionnaire and interview data was thoroughly analyzed, looking for similarity, difference, frequency, sequence, and correspondence (Saldaña, 2013). As a result of data analysis, nine themes emerged that span across four concepts. These themes are directly related to the three research questions, as illustrated in Figure 13.

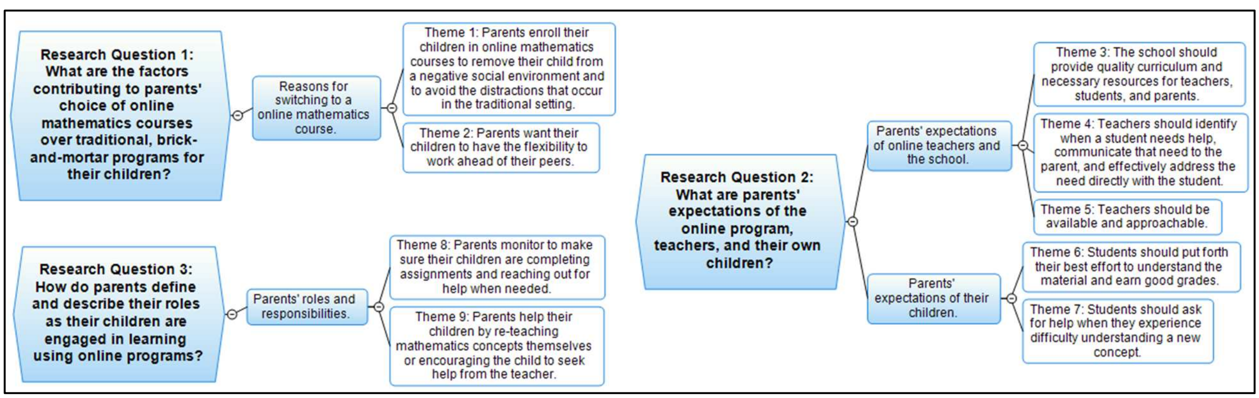

Figure 13. Connecting research questions to emerging concepts and themes.

Connecting to Existing Research and Implications for Practice

There is consensus in the research community that parental involvement has a seemingly positive effect on student achievement in K-12 online courses (Black, 2009; Borup, Graham, & Davies, 2013; Borup, Stevens, & Waters, 2015; Currie-Rubin & Smith, 2014; Curtis, 2013;

Waters, Menchaca, & Borup, 2014). However, a research review by Waters, Menchaca, and Borup (2014) argues that more research is needed to "better understand how to persuade parents to be more involved in their children's schooling in these alternative [online] settings" (p. 311). The first rule in marketing is to understand your audience (Newman, 2014). Therefore, if schools are to persuade parents to be more involved, they must first understand who their parents are and how they perceive their own roles.

There is a void of literature on the specific roles and responsibilities of parents in online education, which this research study helps to fill. This research study helped gain a better understanding of how parents at Online Academy define and describe their roles and responsibilities in online mathematics courses. Consistent with other research (Black, 2009; Curtis, 2013; Thurber, 2013; Waters, Menchaca, & Borup, 2014), the findings of this study could help the education community—researchers, teachers, and administrators—improve upon efforts to engage parents in the learning process.

Why do parents enroll their children into online mathematics courses? Knowing parents' motivations for moving their children from a traditional mathematics course into an online course might provide a glimpse into their expectations of the program. In other words, I wanted to know what it was the parent participants in this study expected to gain from having their child in an online mathematics course rather than in a traditional brick-and-mortar school. In both the questionnaire and the interviews, parents were asked the question, "Why did you choose to enroll your child in an online mathematics course?" As a result of an analysis of over 550 written questionnaire responses and six individual interviews, I found that participant parents mostly stated issues they wanted to avoid in the traditional setting rather than what they hoped to gain in the online setting. Specifically, questionnaire and interview participants described disruptions in the classroom and the behavior of other students as primary reasons for leaving the traditional setting. They also reflected the desire for their child to work at their own pace, without being "confined to the schedule based on other students in the class" (Parent 22, questionnaire).

Of the parents who responded to the questionnaire item regrading why they enrolled their child in an online mathematics course, about 25% described the behavior of other children as an impediment to their own child's progress. Many of the questionnaire responses echoed the desire of Parent 33 "… to take all the distraction from the [traditional] school away" (questionnaire). Factors that drive parents and students away from traditional school settings are referred to as push factors, whereas factors that attract students to the online setting are referred to as pull factors (Morabito, 2010; Waters, Menchaca, & Borup, 2014). In this research study, parents' questionnaire and interview responses surrounding their motivation for enrolling their children in an online mathematics program focused more on why they left the traditional setting (push factors) rather than what they thought would be beneficial in the online setting (pull factors). Participant parents articulated specific things about the traditional setting that they wanted to escape, such as disruptive students, overhead distractions in the classroom, and waiting for other students to learn before being able to move onto the next topic. What they did not articulate were the specific benefits of moving to an online setting.

Morabito (2010) found that students' reasons for taking online courses fell within four categories: classroom setting, flexibility of setting, individualized curriculum, or social issues related to school culture. Interestingly though, she found that students' attribution of success did not align with their motivations for leaving the traditional setting. For example, if a student said he moved to an online course to avoid distractions, he might have attributed his success to the individualization of the online curriculum. This perhaps indicates that students leave the traditional environment for reasons they can articulate, but without really knowing what to expect in the online environment. Morabito (2010) acknowledged the necessity of more research before generalizing her findings to a more diverse population.

Implications for practice. The themes that emerged from this research study (see Figure 13) provide the education community with a greater insight into the perceptions of parents regarding online mathematics courses. However, this study was bounded by the confines of just one online program. Though the results of this research cannot necessarily be generalized to other online programs, the themes that emerged do have practical implications for the field of online education. When asked why they chose to enroll their child in an online mathematics program, most parents in this study described factors they wanted to avoid in the traditional classroom rather than what they perceived to gain from a move to the online classroom. Perhaps this is because participant parents were unfamiliar with the online setting, but willing to risk the unknown to remove their child from the traditional setting. I argue that it is necessary that online program administrators systematically educate prospective parents regarding potential challenges and benefits of online learning so that parents have the opportunity to make informed decisions regarding the best learning environment for their child.

Parents in this study did not explicitly state the perceived benefits that attracted them to the online setting though they can be implied from their reasons given for leaving the traditional setting. For example, when a parent stated that he enrolled his daughter in an online mathematics course because there were too many distractions in the traditional classroom, he was implying that he expected there to be less distractions in the online environment.

Students likely have greater control over their environment when taking online courses, however, there are other potential distractions that students and parents might not anticipate and are not yet familiar with overcoming. Reiner (2014) describes two types of distractions in the online learning environment: external and internal. External distractions are those students likely have more control over, such as noise level and lighting. However, internal distractions are those that come within the self, such as thoughts of hunger or anticipation of an upcoming outing. Taking courses online presents a new type of distraction, *digital distractions*, which can be both external and internal (Reiner, 2014). The external distraction is easier to manage, for example by simply turning off the device. The real danger is when digital distractions become internal. For example, thoughts such as, “I wonder if anyone texted me” or “I wonder if I have any new followers” keep students from being able to fully engage in their learning activities.

Engagement is primary to success in online courses (Dixson, 2010). Removing external distractions, such as by taking a student’s phone away until the end of the day, does not guarantee that the distraction has been alleviated. According to Reiner (2013) the solution is to remove the internal desire to give in to these external distractions. Teachers and administrators have experience working with students to address nuances of learning in an online environment. That expertise could be channeled to intentionally educate parents and students about the indicators of these obstacles and empower them with strategies to overcome these distractions, before they become detrimental to academic success.

What are parents’ expectations of the school, teachers and their children? Curtis and Werth (2015) recommended that online K-12 schools provide “support to families by communicating, being transparent with tools, and individualizing instruction” (p. 163). A theme that emerged in this research study is participant parents’ expectation for the school to provide sufficient resources to foster student success, including the hiring of effective online teachers. Archambault and Kennedy (2014) suggest that effective teachers of online courses are able to:

> (a) Convey knowledge with limited face-to-face contact, (b) design and develop course content in a technology-based environment, (c) deliver content in a way that will engage students, and (d) use assessment measures to assure that students master content. (p. 226)

Parents in this research study described expectations that align with two of the four skills that Archambault and Kennedy (2014) declare are required of effective online teachers: (a) convey knowledge with limited face-to-face contact, and (d) use assessment measures to assure that students master content. Parents' comments referring to course content or delivery were in response to expectations of the school although those are largely responsibilities of the teacher.

Participant parents expect teachers to identify when a student needs help, communicate that need to the parent, and effectively address the need with the student. In an online course, identifying that a student needs help is different than in a traditional classroom setting. Unlike the traditional classroom teacher who is physically present with a student when he or she is engaging in schoolwork, the online teacher cannot pick up on signs of frustration or confusion that are typically communicated through body language. Online teachers rely on raw data such as grades on lessons and time spent on an activity to surmise that an intervention is necessary. This aligns with the skill that Archambault and Kennedy (2014) describe as being able to "(d) use assessment measures to assure that students master content" (p. 226).

After identifying that a student needs help, participant parents expressed the desire for teachers to effectively provide help to the individual student. Interactions in the online environment are different than in the traditional environment (Borup, Graham, & Davies, 2013; McIsaac & Blocher, 1998; Vrasidas & McIsaac, 1999). Rather than being able to physically approach a student and verbally offer support, teachers must engage the child from a distance and through various modalities which include both synchronous and asynchronous methods, such as phone calls, text messages, and emails. The distance between the student and the teacher supports Waters, Menchaca, and Borup's (2014) suggestion for schools to clearly communicate their policies and expectations for communication and involvement in online courses.

Research analysis revealed that questionnaire participants' responses surrounding their expectations of teachers focused almost entirely on teacher-student and teacher-parent interactions, such as the following questionnaire response, "I expect her math instructor to be available to both the Learner and the parent to answer specific questions, encourage strategies for learning, and to inform me as the parent of how I can help at home" (Parent 62). Another parent wrote, "My expectations for the teacher are that she is there to help my child to understand the concepts. She is available for questions and is patient" (Parent 59, questionnaire). The theme that parents expect online teachers to be approachable and available to help their children is corroborated by recent research on interactions in K-12 online courses.

McIsaac and Blocher (2008) found that the more conversations that occur between the student and teacher, the smaller the transactional distance and the more successful the learning experience. Borup, Graham, and Davies (2013) studied the perceived motivational values of different types of interactions such as parent-instructor, learner-parent, and learner-learner. The researchers found that parents perceived learner-instructor interactions as being the most motivational for their children whereas the children perceived both learner-instructor and learner-parent interactions statistically significantly more motivational than learner-learner, learner-content, and parent-instructor interactions. Borup, Graham, and Davies (2013) also found that as the quantity of parent-learner interactions increased, the course outcomes decreased. They suspect this is because interactions might increase following poor student performance, not the other way around.

Parents in this research study accentuated the expectation for their child to put forth their best effort and reach out for help when needed, particularly in the questionnaire responses. Curtis and Werth (2015) suggested that students in online K-12 schools must be “self-motivated, engaged and participating, and accountable for their own learning” (p. 163). Boulton (2008) conducted research over the period of two years that studied several caveats of secondary online education including the changing role of the learner, the challenges faced by the students, and the possible impact of online learning on students. The researcher concluded the need to bring awareness to the idea that primary and secondary school students “need training in using e-learning materials and developing independent learning skills” (p. 17). Boulton (2008) emphasized that “preparation needs to be carried out at the school level prior to introducing e-learning [to students]” (p. 11).

Implications for practice. Understanding parents’ expectations can impact the way that stakeholders in K-12 education—students, parents, teachers, administrators, course designers, researchers—think about their perspective roles and work together towards improving student achievement in online education. For instance, the findings of this research study suggest the need for teachers to clearly communicate, to both parents and students, their expectations of when and how students should reach out for help. Participant parents expect teachers to identify when their child is struggling academically and reach out to the child to offer help. Due to dynamics of the online learning environment, such as flexibility of space and time, teachers are less likely to be able to respond in the exact moment that students needs help. Therefore, students benefit when they take ownership of their learning experience (Curtis, 2013; Waters, Menchaca, and Borup, 2014). This resonated in theme seven of this research study: that participant parents expect students to reach out for help when they experience difficulty understanding a new concept. Teachers and parents should acknowledge that students are likely not accustomed to communicating with their teachers outside of the physical classroom and might resist or feel awkward at first. Accordingly, parents can work closely with their children, especially at the beginning of the course, to guide the students to effectively communicate with their teachers. Students might benefit from having their parent assist them with sending a text message or engaging in role-play to prepare the child for a phone call to the teacher. As the student becomes increasingly confident initiating contact with the teacher the parent can reduce the amount of support.

According to Archambault and Kennedy (2014), "As our society and schools become increasingly connected, demands on teachers and the many roles they are asked to fill continue to expand" (p. 225). Parents in this research study described expectations that align with two of the four skills that Archambault and Kennedy (2014) argue are required of effective online teachers: the ability to convey knowledge with limited face-to-face contact, and the ability to use assessments to know when students have mastered content and when they need help. The other two skills Archambault and Kennedy (2014) use to describe effective online teachers, regarding content and delivery, were mentioned when parents described their expectations of the school. Parents of students at Online Academy who participated in this research study credited the school as a whole with providing course content and delivery. However, beyond choosing and purchasing the online learning platform to be utilized, these are actually responsibilities of the teachers.

Online educational programs can vary greatly (Dawson & Dana, 2014). Though the specific duties of teachers differ across online programs, some of the responsibilities of teachers at Online Academy that were not emphasized by parents in this study include: preparing and implementing hands-on activities; creating and editing digital content, such as recorded lectures and interactive online lessons; planning field trips and social gatherings; grading and providing feedback on student work; engaging in professional learning activities, such as a group book-study; preparing and organizing supplemental resources to further support individual learners; creating, facilitating, and providing meaningful feedback on projects and authentic assessments of student learning; sponsoring a club; tracking student achievement to identify students who might need special education services; and monitoring and reporting grades to the homeschools. In fact, studies have found that teachers require more time to teach a course online than in the traditional setting (Sorenson, 2014). The responsibilities that participant parents did *not* mention as expectations of teachers could suggest a possible lack of awareness or understanding of the various responsibilities of online teachers or a discrepancy in what the parents value and what the administration and teachers spend time doing. Parents and teachers might benefit from a mutual understanding of each other's roles.

What are the roles and responsibilities of parents in online learning? The purpose of this study was to provide an illustration of parental involvement in high school online mathematics courses at Online Academy. This primarily required gaining a thorough understanding of the roles and responsibilities of participant parents, from their own perspective. Throughout this research study, participant parents asserted that their responsibilities include monitoring their children, helping their children with the mathematics course, and arranging academic support for their children when necessary. This aligns with previous research that found that parents often take on the responsibility of answering questions, reinforcing completion of lessons, and ensuring that students are engaged and remain on task as they navigate online coursework (Bicknell, 2014; Currie-Rubin & Smith, 2014). Likewise, Curtis and Werth (2015) suggested that parents of children in online courses “should be available to monitor, mentor, and motivate students” (p. 163). Though there is accordance that parental involvement in online courses is important, literature differs on the impact of these roles on student achievement.

Researchers agree that parental involvement in online K-12 education is a fundamental element of student achievement (Boulton, 2008; Black, 2009; Currie-Rubin & Smith, 2013; Thurber, 2013). They also agree that more research is required to understand the impact of characteristics of parental involvement, such as the frequency and style of parent-learner interactions. For example, Black (2009) found that parent-learner interactions centered on content were not statistically significantly correlated with student course outcomes. However, in their 2013 research on interactions in an online K-12 setting, Borup, Graham, and Davies proclaimed that a large majority of parent-learner interactions were focused on content.

On the questionnaires in this research study, the phrases most frequently used by parents to describe their responsibilities surrounding online mathematics courses were “to help” and “to make sure”. Over 50% of parents who provided written descriptions of their responsibilities characterized the role of a monitor, making sure “the work is being done and Makayla [pseudonym] is taking it seriously” (Parent 21, questionnaire). Of the 74 parents who completed the Cai (2003) parental involvement question (PIQ) portion of the online questionnaire in this research study, more parents scored highest in the role of monitor than any other role. Waters, Menchaca, and Borup (2014) proclaimed that when students take ownership of their own learning outcomes the daily demand for parental involvement decreases. Similarly, Curtis (2013) found that parents of successful online students reported spending time during the beginning of the course helping their child establish good working routines. As the child demonstrated increased confidence to initiate communication with their instruction, as well as the ability to plan and execute successful completion of course requirements, parents in Curtis' (2013) study reported a decrease in the amount of time spent monitoring their child's progress.

Implications for practice. Combined with existing literature on parental involvement in online learning environments, results of this study imply the need for schools to clearly and consistently communicate their expectations for parental involvement, otherwise parents might fail to understand the level of commitment expected (Water, Menchaca, and Borup, 2014). Parents often occupy the physical space normally held by the teacher in a traditional classroom (Black, 2009; Waters, Menchaca, & Borup, 2014). Teachers recognize that parents might not always have the background knowledge necessary to most effectively facilitate online learning (Currie-Rubin & Smith, 2014). Boulton (2008) asserted that schools have a responsibility to prepare students and parents for their respective roles prior to actually engaging in the online courses. Considering the prominence in this research study of the theme that participant parents desire to help their children be successful in their online mathematics courses, parents might benefit from training on specific instructional support strategies.

In addition to training on specific instructional strategies to *improve* parental interactions, efforts can be made to *increase* parental involvement. Schools are encouraged to view parental involvement as an act of doing "with" rather than "to" (Ferlazzo, 2011). Valuing parents as a member of a child's academic support team—alongside teachers and administrators—requires changes to both the content and delivery of information from the school. For example, in addition to disseminating information on *how* to access parent accounts, schools could include information on *why* it is important to access parent accounts. Furthermore, schools could offer suggestions and ongoing support to parents on ways to use information found within parent accounts to better support their children.

Borup, Graham, and Davies (2013) found that students viewed learner-parent interactions statistically significantly more motivational than did their parents. They suggested this might be in part because parents did not fully understand the impact they have on student achievement. Waters, Menchaca, and Borup (2014) reported that increased levels of parental involvement led to greater satisfaction with school between students and parents. Perhaps parents would be more intentional about their interactions if they knew how they are valued by their children.

Throughout this research study, participant parents communicated an expectation that teachers identify when help is needed and provide necessary interventions. Participant parents also described that their own primary responsibility is to know when their child needs help and to provide or arrange that support. On the surface, these two expectations are contradictory; who is responsible for identifying when help is needed and who is assumed to provide that help? However, rather than viewing these as conflicting expectations, perhaps they reveal an underlying desire for teachers and parents to work *together* to identify needs and support students. Therefore, teachers and administrators might benefit from finding ways to build camaraderie between teachers and parents so that together they can provide effective and intentional support to students.

Suggestions for Further Research

Online programs differ in considerable ways (Dawson & Dana, 2014; Evergreen Education Group, 2015). Therefore, larger scaled and mixed-methods research studies are needed to allow generalizable and replicable findings related to parental involvement. Pertaining to online education and, more specifically, online mathematics education, several suggested areas for future research are needed. These include: (a) perceptions of success, (b) students receiving special education services, (c) impact of PIQ role on student achievement, and (d) empowering parents to provide academic support to their children.

Perceptions of success in online courses. Further research is needed to better understand how parents define success in online courses (Morabito, 2010). In this study, questionnaire participants were asked to articulate their expectations of the school (i.e. administrators), the teachers, and their children for the purpose of painting a clearer picture of their perception of the division of responsibilities in the online learning environment. Altogether, participant parents' responses reflected a desire for all parties involved to provide the necessary support to ensure success in the online mathematics course. Parent 59 wrote, "The school needs to support my student so they can be successful" (questionnaire). Questionnaire participants frequently used words such as "support," "help", and "success". Unfortunately, these words are vague and might have different meanings for different stakeholders. A better understanding of the perceptions of success would ensure that all parties involved—students, teachers, parents, administrators, course designers—are working towards a common goal.

Students receiving special education services in online courses. In the questionnaire portion of this research study, sixty-three parents wrote their own definition of success in an online mathematics course. Next, they were asked to describe whether or not their child is being successful in the online mathematics course, based on their own definition. As a whole, the majority of participant parents responded that their child is successful in the online mathematics course. However, when answers were sorted by sub-populations, it became evident that not a single parent of a student receiving special education services (with an IEP) responded that their child was being successful. This raises several questions that could be explored in future research, such as: What additional supports are needed for students receiving special education services? How can online courses be designed to better support the needs of parents and students with documented disabilities? Why do parents who report their child as unsuccessful in a choice setting not return their child to the traditional setting, or explore other options?

Questionnaire participants who reported having a child with an IEP reported less frequent interactions with their child regarding the mathematics course than parents of children without an IEP. Of parents of children with an IEP, 63% reported asking their child about the mathematics course at least once per week; 93% of parents of children without an IEP reported asking their child about the mathematics course at least once per week, refer back to Table 9 in Chapter 4. Similarly, analysis of the questionnaire data revealed that parents of students with an IEP reported helping their children with the mathematics courses at a lower frequency than parents of students without an IEP.

The question regarding why parents choose to keep their child in an online course, even when they report that the child is unsuccessful, does not apply only to parents of children receiving special education services. Perhaps the reason parents keep their child in the online setting is that they feel there is no better option, such as when a child is hospitalized long term. Or perhaps, even though the student does not meet the parent's definition of success, they perceive the student as doing better than they had been in the traditional setting. Consistent with exiting research (Morabito, 2010), this reiterates the need for more research on the perceptions of success in online courses.

Impact of PIQ roles. In this research study, Cai’s (2003) Parental Involvement Questionnaire (PIQ) was used to group participants based on answers to questions that implied similar values. Using the results of this instrument, each questionnaire participant was labeled as either monitor, resource provider, motivator, mathematics content adviser, or mathematics learning counselor. Parents who did not score highest in a single role were grouped together and labeled *multiple roles*. Possible areas of interest emerged such as the potential relationship between a parent’s PIQ role and the student’s success, PIQ role and race/ethnicity, and PIQ role and household income level. For example, in this study, the majority of parents in four of the five PIQ roles reported that their child is successful in the online mathematics course. The majority of parents in the motivator group did not report their child as being successful. Further investigation with a larger sample size should be performed before any generalizable conclusions can be made.

Empowering parents to provide academic support to their children. A topic of suggested research is ways schools can empower parents to better help their children. One of the most prominent themes that emerged from analysis of parents’ responses in this research study was the perceived role they play in helping their children with the mathematics course. In participant parents’ written descriptions of their own responsibilities in the online mathematics course, *help* was the word used most frequently. Most often, the word *help* was used in one of two contexts: to help their child with the mathematics course; or to make sure their child receives the help they need.

Both in the questionnaire responses and personal interviews, parents described engaging in the online lessons alongside their child to learn or review the mathematical concepts in hopes of being able to provide clarification for their child. Participant parents also reported searching the internet for additional resources to review mathematical concepts. This raises the question of how efficiently parents are able to locate supplemental resources that align with the lesson objectives. Also, it raises the question of parent and learner interactions with the teacher. At what point does either the parent or child indicate to the teacher that they are in need of assistance? Consistent with other research, there is a need to explore the ways in which students and parents initiate getting help with online content (Borup, Stevens, & Waters, 2015), and more specifically mathematics content. Future research should be conducted on effective methods of building collaborative teams of teachers and parents that better support students. Rather than mathematics help coming from *either* the teacher *or* the parent, students might benefit from receiving support from *both* the teacher *and* the parent.

Conclusion

This research study has both theoretical and practical significance by adding to the literature investigating parental roles in education and providing insight on the nature of parental involvement and engagement with online mathematics courses. This study is important for practitioners as they explore the role of parental involvement and engagement in advancing their children's learning. The results of this study could be used to motivate the education community to improve upon efforts that promote parental engagement in online mathematics learning environments. Researchers agree that parental involvement has an important impact on student achievement in both traditional and online learning environments (Boulton, 2008; Currie-Rubin & Smith, 2014, Curtis, 2013, Thurber, 2013).

Online learning is here is to stay and we need learn to do it well (Dixon, 2010). Nguyen (2015) eloquently stated that “Online learning is a story that is still being written, and how it progresses will likely depend on those present” (p. 316). Combined with other research, findings of this study can inform administrators, course designers, teachers, and other parents by suggesting ways to improve program design that positively progresses student success in online mathematics courses.

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APPENDICES

Appendix A

Cai's (2003) 23-item PIQ

Motivator

1. When my child says he/she is having trouble learning mathematics, I tell him/her not to worry about it because everybody has problems with mathematics.
2. At home, I encourage my child to work hard on mathematics problems even though the problems are difficult.
3. I am usually able to motivate my child to learn mathematics well.
4. Mathematics plays an important role in my child's future.
5. I don't know how to motivate my child to do a good job on his/her mathematics assignments.

Resource provider

6. I try hard to have a nice learning environment at home for my child to do mathematics.
7. I often take my child to the public library.
8. I often buy mathematics -related books for my child.
9. At our house, we have a variety of games and puzzles that encourage the development of my child's mathematics skills.

Monitor

10. I check my child's homework regularly.
11. I seldom spend time talking with my child about his/her progress in mathematics.
12. At home, it is important for my child to keep a balance between mathematics and his/her other subjects.
13. I always try to monitor the amount of the time my child spends on mathematics at home.
14. I am always aware of my child's mathematics requirements by checking notebooks, using learning line, or through phone calls to school.

Mathematics content adviser

15. I feel I can help my child solve problems from mathematics class.
16. I think I know enough about algebra to help my child.
17. I often discuss with my child how mathematics is used in our everyday life.
18. I make an effort to understand the mathematics my child is studying.

Mathematics learning counselor

19. I don't know strategies for helping my child overcome weaknesses in mathematics.
20. I am aware of the approaches used to teach mathematics at my child's school.
21. I always try to figure out good approaches for helping my child learn different mathematics topics.
22. I understand my child's strengths and weaknesses in learning mathematics.
23. I try to match my expectations with my child's potential.

Appendix B

Questionnaire Items

Page 1. If you agree to participate in this research, please check “I agree” and continue with the questionnaire.

Page 2. How many children do you have in a high school mathematics class at Online Academy?

Page 3. Have you ever completed an online course?

Page 4. Have you ever completed an online mathematics course?

Page 5. Please indicate if you *strongly agree*, *agree*, *disagree*, or *strongly disagree* with each of the following statements.

1. I often discuss with my child how mathematics is used in our everyday life.
2. I often take my child to the public library.
3. I am always aware of my child's mathematics requirements by checking the assignment calendar, the progress report, or through communication with the teacher.
4. When my child says he/she is having trouble learning mathematics, I tell him/her not to worry about it because everybody has problems with mathematics.
5. I feel I can help my child solve problems from mathematics class.

Page 6. Please indicate if you *strongly agree*, *agree*, *disagree*, or *strongly disagree* with each of the following statements.

1. I seldom spend time talking with my child about his/her progress in mathematics.
2. I am aware of the approaches used to teach mathematics at my child's school.
3. At our house, we have a variety of games and puzzles that encourage the development of my child's mathematics skills.
4. Mathematics plays an important role in my child's future.
5. At home, I encourage my child to work hard on mathematics problems even though the problems are difficult.

Page 7. Please indicate if you *strongly agree*, *agree*, *disagree*, or *strongly disagree* with each of the following statements.

1. I am usually able to motivate my child to learn mathematics well.
2. I often buy mathematics-related books for my child.
3. I always try to monitor the amount of the time my child spends on mathematics at home.
4. I make an effort to understand the mathematics my child is studying.
5. I try to match my expectations with my child's potential.

Page 8. Please indicate if you *strongly agree*, *agree*, *disagree*, or *strongly disagree* with each of the following statements.

1. I don't know how to motivate my child to do a good job on his/her mathematics assignments.
2. I check my child's schoolwork regularly.
3. I understand my child's strengths and weaknesses in learning mathematics.

4. I don't know strategies for helping my child overcome weaknesses in mathematics.

Page 9. Please indicate if you *strongly agree*, *agree*, *disagree*, or *strongly disagree* with each of the following statements.

1. I try hard to have a nice learning environment at home for my child to do mathematics.
2. At home, it is important for my child to keep a balance between mathematics and his/her other subjects.
3. I think I know enough about algebra to help my child.
4. I always try to figure out good approaches for helping my child learn different mathematics topics.

Page 10. How long has this child been enrolled in an online mathematics course? *

Page 11. Why did you choose to enroll your child in an online mathematics class? (Text entry response) *

Page 12. How do you define success in an online mathematics class? (Text entry response)

Page 13. Based on your definition of success, is your child successful in the online mathematics course? Please be specific. (Text entry response) *

Page 14. What is your child’s gender? *

Page 15. Does this child have an Individualized Education Program (IEP)? *

Page 16. Does this child have a 504 plan? *

Page 17. Has this child been identified as gifted? *

Page 18. What is your relationship to your child? *

Page 19. Which race/ethnicity best describes your child? *

Page 20. How often do you ask your child about his/her mathematics course? *

Page 21. How often do you help your child with his/her mathematics assignments? *

Page 22. How many semesters has this student been enrolled in an online mathematics course? *

*Pages 23-59. If the response to the question, “How many children do you have in a high school mathematics class at Online Academy?” was greater than 1, these questions were repeated. The phrase “your child” was replaced with “your second child”, and then “your third child”. These pages only appeared if applicable.

Page 60. How is parenting in a traditional mathematics course different from parenting in an online mathematics course?

Page 61. How is parenting in a traditional mathematics course the same as parenting in an online mathematics course?

Page 62. In regards to your child’s mathematics class, what are your expectations of the school?

Page 63. In regards to your child’s mathematics class, what are your expectations of the teacher?

Page 64. In regards to your child’s mathematics class, what are your expectations of your child?

Page 65. In regards to your child’s mathematics class, what do you feel are your responsibilities as the parent?

Page 66. Would you like to volunteer for a survey? **

**If “yes”.

Page 67. What is your name?

Page 68. How would you like to be contacted to schedule an interview? (Please provide your phone number and/or email address.)

Page 69. Which race/ethnicity best describes you?

Page 70. What is your approximate household income?

Page 71. What is your highest level of education?

Appendix C

Interview Protocol Form

Post Interview Comments or Leads:

Roles of Parents in Virtual School Programs Interview

Thank you for your agreeing to participate in this interview. To facilitate my note-taking, I would like to audio record our conversation today. If you agree to participate in this research and be audio recorded, please state "I Agree".

Great, thank you. A copy of the informed consent was sent to you via email. Essentially, this document states that: (1) all information will be held confidential, (2) your participation is voluntary and you may stop at any time if you feel uncomfortable, and (3) that I do not intend to inflict any harm.

Introduction

You have been selected to speak with today because you are the parent of a child in an online mathematics class. The purpose of this research is to gain a better understanding of the multiple roles that parents play in their child's education, specifically regarding mathematics courses. This study does not aim to evaluate your techniques or experiences. Rather, I am trying to learn as much as possible in an effort to paint a robust picture of online mathematics classes from the parents' perspective.

Interview Questions & Potential Follow-up Questions:

1. *What is your experience with online school programs?*
    a. How many children do you have? How many years in virtual school?
    b. How long have your children participated in virtual schools?
    c. What type of educational setting had your child experienced before enrolling in online courses?
2. What made you first consider enrolling your child(ren) in online courses?
    a. What made you actually decide to enroll your child in online classes?
        i. Influenced by the child's desire?
        ii. Influenced by school personnel (teachers, counselors, principal, etc.)?
3. A common theme that came up in the survey was the desire to avoid disruptions in the traditional classroom. Can you expand on this? What are these disruptions that are occurring in traditional classrooms?
4. Before actually starting online classes, what were your expectations of the online learning experience?

    a. Have you ever taken an online class?
    b. In your own online classes, do you feel that experience better prepared you for your experience at Online Academy?
    c. How did you think the mathematics class might be the same or different from your child's previous school setting?
    d. Did you have any specific expectations or thoughts about the online mathematics class?
5. How does your actual experience with the online mathematics classes compare to what you had expected?
6. *How do you describe your role as a parent of a child in a full-time virtual school program?*
    a. If you were talking to a parent who was considering enrolling their child in an online program, what advice would you give them?

    b. How do you describe your weekly/day-to-day involvement in the program? Specifically the mathematics course.
7. From your perspective, what (if any) are the differences between having children in a virtual program versus a traditional program?
    a. What were your expectations when your child first began the program?
8. *Pertaining to the online mathematics course, in one word, how do you describe your role in your child's daily schooling? Why?*
9. What suggestions do you have for ways that teachers and administrators can better support parents in virtual school programs? Broadly or in math.
10. Is there anything else you'd like to add about your experience as a parent of a child in an online mathematics course?

That concludes our interview. I very much appreciate your participation!

Appendix D

Initial Parent Email

Dear Parent,
You are invited to participate in a research study. The purpose of the study is to investigate the roles of parents in online high school mathematics courses. You are invited to participate because your child is in an online mathematics class in high school.

From this research we hope to gain information about the roles of parents in online mathematics courses. This could lead to suggestions about ways to provide better support to families with children in online mathematics classes.

There are two parts to this study: a questionnaire and interviews. If you choose to participate in this study, you can do just one, or both. The questionnaire is expected to take about 15-30 minutes and the interview will last 30-45 minutes.

If you would like to participate in this research study by completing a questionnaire, please click on the questionnaire link.

Click HERE to begin the QUESTIONNAIRE

A copy of the informed consent form is embedded in the questionnaire. The consent form is also attached to this email.

Parents who complete the online questionnaire are also being asked to volunteer for an interview. Of those who volunteer, up to 10 will be purposefully selected to participate in an interview. If you would like to participate in an interview but do not wish to complete the questionnaire, please email kgoldhahn1@student.gsu.edu with your name and preferred contact method (phone number or email address).

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. There is no compensation for participation in this study.

We hope that you will consider participating in this study and adding to research on online learning.

Sincerely,
Dr. Iman Chahine and Karla Goldhahn Cwetna

Appendix E

IRB Approval Letter

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
Atlanta, Georgia 30302-3999
Phone: 404/413-3500
Fax: 404/413-3504

In Person: Dahlberg Hall
30 Courtland St, Suite 217

Georgia State University

December 08, 2015

Principal Investigator: Iman Chahine

Key Personnel: Chahine, Iman; Goldhahn, Karla; Goldhahn, Karla F, PhD Teaching & Learning, Math; Tinker Sachs, Gertrude, PhD

Study Department: Middle & Secondary Education

Study Title: Real Parenting in a Virtual World: Roles of Parents in Online Mathematics Courses

Funding Agency:

Review Type: Expedited 6, 7

IRB Number: H16262

Reference Number: 336629

Approval Date: 12/08/2015

Expiration Date: 12/07/2016

The Georgia State University Institutional Review Board (IRB) reviewed and approved the above referenced study in accordance with 45 CFR 46.111. The IRB has reviewed and approved the study and any informed consent forms, recruitment materials, and other research materials that are marked as approved in the application. The approval period is listed above. Research that has been approved by the IRB may be subject to further appropriate review and approval or disapproval by officials of the Institution.

Federal regulations require researchers to follow specific procedures in a timely manner. For the protection of all concerned, the IRB calls your attention to the following obligations that you have as Principal Investigator of this study.

1. For any changes to the study (except to protect the safety of participants), an Amendment Application must be submitted to the IRB. The Amendment Application must be reviewed and approved before any changes can take place.

2. Any unanticipated/adverse events or problems occurring as a result of participation in this study must be reported immediately to the IRB using the Unanticipated/Adverse Event Form.

3. Principal investigators are responsible for ensuring that informed consent is properly documented in accordance with 45 CFR 46.116.

   - The Informed Consent Form (ICF) used must be the one reviewed and approved by the IRB with the approval dates stamped on each page.
   - A Waiver of Documentation of Consent has been approved for this study in accordance with the requirements set forth in 45 CFR 46.117 c.

4. For any research that is conducted beyond the approval period, a Renewal Application must be submitted at least 30 days prior to the expiration date. The Renewal Application must be approved by the IRB before the expiration date else automatic termination of this study will occur. If the study expires, all research activities associated with the study must cease and a new application must be approved before any work can continue.

5. When the study is completed, a Study Closure Report must be submitted to the IRB.

All of the above referenced forms are available online at http://protocol.gsu.edu. Please do not hesitate to contact the Office of Research Integrity (404-413-3500) if you have any questions or concerns.

Sincerely,

Cynthia A. Hoffner, IRB Vice-Chair

Federal Wide Assurance Number: 00000129

Appendix F

Informed Consent, Questionnaire

Title: Real Parenting in a Virtual World: Roles of Parents in Online Mathematics Courses
Principal Investigator: Iman Chahine, PhD.

Student Principal Investigator: Karla Goldhahn Cwetna

I. Purpose:
You are invited to participate in a research study. The purpose of the study is to investigate the roles of parents in online high school mathematics courses. You are invited to participate because your child is in an online mathematics class in high school. We will recruit up to 600 parents to participate in a questionnaire. Participation in the questionnaire will require about 15-30 minutes of your time.

II. Procedures:

If you decide to participate in the questionnaire, you can complete the questionnaire from any place you have internet access. The questionnaire will be available online for two weeks in January. The questionnaire will take about 15-30 minutes to complete.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about the roles of parents in online mathematics courses. This could lead to suggestions about ways to provide better support to families with children in online mathematics classes.

V. Voluntary Participation and Withdrawal:
Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, it will not impact you or your child.

VI. Confidentiality:
We will keep your records private to the extent allowed by law. Dr. Iman Chahine (Principal Investigator) and Karla Cwetna (Student Principal Investigator) will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, and the Office for Human Research Protection (OHRP)).

Data sent over the internet may not be secure. At the end of the questionnaire, you will have the opportunity to volunteer for an individual interview by providing your contact information. If you provide your contact information, your answers to the questionnaire will be identifiable. However, no matter what you decide, it will not impact you or your child.

Your name and other facts that might point to you or your child will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally. No names of teachers, schools, or the school system will be mentioned in the final report of this study.

VII. Contact Persons:

Contact Iman Chahine (ichahine@gsu.edu or 404.413.8407) and/or Karla G. Cwetna (kgoldhahn1@student.gsu.edu or 770.468.0328) if you have any questions, concerns or complaints about this study. You can also call if you think you have been harmed by the study.

Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. Copy of Consent Form to Subject:

You may print a copy of this consent form for your records.

If you agree to participate in this research, please check “I agree” and continue with the questionnaire.

Appendix G

Informed Consent, In-Person Interview

Title: Real Parenting in a Virtual World: Roles of Parents in Online Mathematics Courses
Principal Investigator: Iman Chahine, PhD.

Student Principal Investigator: Karla Goldhahn Cwetna

I. Purpose:

You are invited to participate in a research study. The purpose of the study is to investigate the roles of parents in online high school mathematics courses. You are invited to participate because your child is in an online mathematics class in high school. Parents who complete the online questionnaire are also being asked to volunteer for an interview. Of those who volunteer, up to 10 will be purposefully selected to participate in an interview.

Participation in an interview will require 30-45 minutes of your time. Interviews will take place during the month of February. Each participant will only take part in one interview.

II. Procedures:

If you decide to participate in the interview, the interview will take place at a location that is agreed upon beforehand. Suggested interview sites include the public library, coffee shops, and outdoor parks. The interview will be audio recorded. Interviews will take place during the month of February. The interview will take about 30-45 minutes.

A copy of the interview transcript will be emailed to you for your records.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about the roles of parents in online mathematics courses. This could lead to suggestions about ways to provide better support to families with children in online mathematics classes.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, it will not impact you or your child.

VI. Confidentiality:

We will keep your records private to the extent allowed by law. Dr. Iman Chahine (Principal Investigator) and Karla Cwetna (Student Principal Investigator) will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, and the Office for Human Research Protection (OHRP)).

We will use initials rather than your name on study records. The interviews will be audio recorded and transcribed. We will store the transcriptions and other data in a locked cabinet in the researcher's home office. We will destroy all audio recordings once this research is finished (approximately August 2016). Any digital information will be stored on a password-protected computer file.

Your name and other facts that might point to you or your child will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally. No names of teachers, schools, or the school system will be mentioned in the final report of this study.

VII. Contact Persons:

Contact Iman Chahine (ichahine@gsu.edu or 404.413.8407) and/or Karla G. Cwetna (kgoldhahn1@student.gsu.edu or 770.468.0328) if you have any questions, concerns or complaints about this study. You can also call if you think you have been harmed by the study.

Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. Copy of Consent Form to Subject:

We will give you a copy of this consent form to keep.

If you are willing to volunteer for this research and be audio recorded, please sign below.

____ ____________________

Participant Date

____ ____________________

Principal Investigator or Researcher Obtaining Consent Date

Appendix H

Informed Consent, Online Interview

Title: Real Parenting in a Virtual World: Roles of Parents in Online Mathematics Courses
Principal Investigator: Iman Chahine, PhD.

Student Principal Investigator: Karla Goldhahn Cwetna

I. Purpose:

You are invited to participate in a research study. The purpose of the study is to investigate the roles of parents in online high school mathematics courses. You are invited to participate because your child is in an online mathematics class in high school. Parents who complete the online questionnaire are also being asked to volunteer for an interview. Of those who volunteer, up to 10 will be purposefully selected to participate in an interview.

Participation in an interview will require 30-45 minutes of your time. Interviews will take place over the course of three weeks in February. Each participant will only take part in one interview.

II. Procedures:

If you decide to participate in the interview online, the interview will be audio and video recorded. The interview will take about 30-45 minutes.

Interviews will take place over the course of three weeks in February. A copy of the interview transcript will be emailed to you for your records.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about the roles of parents in online mathematics courses. This could lead to suggestions about ways to provide better support to families with children in online mathematics classes.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, it will not impact you or your child.

VI. Confidentiality:

We will keep your records private to the extent allowed by law. Dr. Iman Chahine (Principal Investigator) and Karla Cwetna (Student Principal Investigator) will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, and the Office for Human Research Protection (OHRP)).

We will use initials rather than your name on study records. The interviews will be audio and video recorded and transcribed. We will store the transcriptions and other data in a locked cabinet in the researcher's home office. We will destroy all audio and video recordings once this research is finished (approximately August 2016). Any digital information will be stored on a password-protected computer file.

Your name and other facts that might point to you or your child will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally. No names of teachers, schools, or the school system will be mentioned in the final report of this study.

VII. Contact Persons:

Contact Iman Chahine (ichahine@gsu.edu or 404.413.8407) and/or Karla G. Cwetna (kgoldhahn1@student.gsu.edu or 770.468.0328) if you have any questions, concerns or complaints about this study. You can also call if you think you have been harmed by the study.

Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. Copy of Consent Form to Subject:

You may print a copy of this consent form for your records.

If you agree to participate in this research and be audio and video recorded, please state “I Agree”.

Appendix I

Informed Consent, Phone Interview

Title: Real Parenting in a Virtual World: Roles of Parents in Online Mathematics Courses
Principal Investigator: Iman Chahine, PhD.

Student Principal Investigator: Karla Goldhahn Cwetna

I. Purpose:

You are invited to participate in a research study. The purpose of the study is to investigate the roles of parents in online high school mathematics courses. You are invited to participate because your child is in an online mathematics class in high school. Parents who complete the online questionnaire are also being asked to volunteer for an interview. Of those who volunteer, up to 10 will be purposefully selected to participate in an interview.

Participation in an interview will require 30-45 minutes of your time. Interviews will take place over the course of three weeks in February. Each participant will only take part in one interview.

II. Procedures:

If you decide to participate in the interview over the phone, the interview will be audio recorded. The interview will take about 30-45 minutes.

Interviews will take place over the course of three weeks in February. A copy of the interview transcript will be emailed to you for your records.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about the roles of parents in online mathematics courses. This could lead to suggestions about ways to provide better support to families with children in online mathematics classes.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, it will not impact you or your child.

VI. Confidentiality:

We will keep your records private to the extent allowed by law. Dr. Iman Chahine (Principal Investigator) and Karla Cwetna (Student Principal Investigator) will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, and the Office for Human Research Protection (OHRP)).

We will use initials rather than your name on study records. The interviews will be audio recorded and transcribed. We will store the transcriptions and other data in a locked cabinet in the researcher's home office. We will destroy all audio recordings once this research is finished (approximately August 2016). Any digital information will be stored on a password-protected computer file.

Your name and other facts that might point to you or your child will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally. No names of teachers, schools, or the school system will be mentioned in the final report of this study.

VII. Contact Persons:

Contact Iman Chahine (ichahine@gsu.edu or 404.413.8407) and/or Karla G. Cwetna (kgoldhahn1@student.gsu.edu or 770.468.0328) if you have any questions, concerns or complaints about this study. You can also call if you think you have been harmed by the study.

Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. Copy of Consent Form to Subject:

You may print a copy of this consent form for your records.

If you agree to participate in this research and be audio recorded, please state “I Agree”.