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Parent–Teacher Online Communication and Third- Through Fifth-Grade Student Academic Achievement

Sandra Joyce McKnight
Walden University

Walden University

College of Education

This is to certify that the doctoral dissertation by

Sandra Joyce Alston-Williams Finley McKnight

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Review Committee
Dr. Debra Tyrrell, Committee Chairperson, Education Faculty
Dr. Michael Marrapodi, Committee Member, Education Faculty
Dr. Nicolae Nistor, University Reviewer, Education Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
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Abstract

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Dissertation Submitted in Partial Fulfillment

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Abstract

Technology-based tools for parent–teacher communication, such as online parent portals, are becoming the preferred method of exchanging information between home and school. However, little research has been conducted on parent–teacher communication using online parent portals. The purpose of this quantitative nonexperimental cross-sectional study was to examine the relationship between parents' use of a parent–teacher online communication parent portal and students' academic achievement. Bandura's social cognitive theory of self-efficacy provided the theoretical framework for this study. Archival data from a Southeast U.S. public school district were used to examine the relationship between parents' average quarterly use of a parent portal and students' average quarterly English language arts (ELA) and mathematics grades at the Grade 3–5 level. Results of two simple bivariate linear regressions did not show a significant relationship between parents' average quarterly use of a parent portal and students' average quarterly ELA or mathematics grades at the Grade 3–5 level. The results may add to the body of knowledge in the field of educational technology and may be used to improve parent–teacher and school–home communication, instructional practices, and students' academic achievement.

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Dedication

I dedicate my dissertation to God for choosing me to pursue and earn my PhD. My ancestors lived and died so I could be free to accomplish this educational journey. Thank you to my mother, Eloise Alston Williams, and my grandmother, Aronea McKinnon Johnson. I love you dearly! These two beautiful, smart, and caring ladies paved the way for me to succeed. Mother and Mama sacrificed, supported, encouraged, and taught me to believe I could do anything and never to give up. I listened to my Mother and Mama. Thanks to my stepfather, James Archie Williams, aka "Grandpa," for loving and supporting me.

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Chapter 1: Introduction to the Study

The topic of this study was the relationship between parent–teacher communication, using an online parent portal, and students' academic achievement at the third- through the fifth-grade level. Online parent portals have become popular because the traditional methods of communication, such as monthly calendars, parent–teacher conferences, visits to the school, and letters, have become ineffective means for educators to communicate with parents about the academic achievement of their children (Natale & Lubniewski, 2018). Results from this study may support the joint efforts of parents, teachers, and schools to employ parent portals to increase students' academic achievement. Technology-based communication can be vital to children's academic achievement because it allows for convenient exchange of information between parents and teachers (Goodall, 2016; Heath, Maghrabi, & Carr, 2015; Siti Fatimah, Abdurahim, & Mashhod, 2016). Chapter 1 includes the background, problem statement, purpose, research questions and hypotheses, theoretical framework, nature of the study, definitions, assumptions, scope and delimitations, limitations, and significance. The chapter concludes with a summary.

Background

Technology-based tools, such as parent portals, are becoming parents' preferred method of communicating with their children's teachers and schools about their students' academic achievement (Palts & Kalmus, 2015; Thompson, Mazer, & Grady, 2015). Technology-based tools facilitate swift, efficient, and convenient communication between home and school (Goodall, 2016; Patrikakou, 2016). Furthermore, this form of

communication can provide multiple opportunities, such as parent portal apps, school and community events, calendar, live chats, and video conferences, for parents and teachers to build relationships between home and school and improve student performance (Can, 2016; Natale & Lubniewski, 2018; Razak, Abdurahim, & Mashhod, 2016; Santiago, Garbacz, Beattie, & Moore, 2016).

A gap in the research exists regarding the relationship between parents' use of online technology-based parent portals and students' academic achievement (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015). In the field of educational technology, researchers agreed that the use of information technology improves students' academic achievement (Blau & Hameiri, 2017; Davis & West, 2014; Goodall, 2016; Siti Fatimah et al., 2016). However, much of the literature on information technology in education has focused on its pedagogical or teaching benefits rather than on increasing the exchange of information between home and school (Goodall, 2016).

According to Goodall (2016), there are sizable costs, both in teacher time and school finances, in using technology-based communication. To provide the best possible evidence in support of digital modes of home–school communication that would justify this investment, more exploration is needed in the area of technology-based parent–teacher communication (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015). Also needed are explorations of parents' and teachers' efficacy in using these technological tools and the influence of the tools on students' academic achievement (Goodall, 2016).

Problem Statement

Traditional forms of communication, such as newsletters and notes, can be ineffective parent–teacher communication methods because they require children to transport them to and from school (Natale & Lubniewski, 2018). They often get left at school or lost along the way (Goodall, 2016; Natale & Lubniewski, 2018; Patrikakou, 2016; Razak et al., 2016). Ineffective parent–teacher communication methods may lead to inconsistencies between parent and teacher expectations (Goodall, 2016; Natale & Lubniewski, 2018; Ratliffe & Ponte, 2018). The problem addressed in the current study was the need to investigate parents' use of technology-based parent portals to communicate about the education of children to examine the relationship between this form of communication and students' academic achievement.

An understanding of factors that can predict home–school connections, such as communication methods, can help establish positive parent–teacher relationships (Goodall, 2016; Natale & Lubniewski, 2018; Palts & Kalmus, 2015; Ratliffe & Ponte, 2018). According to Natale and Lubniewski (2018) and Palts and Kalmus (2015), parents and teachers believe that digital technologies significantly influence parent–teacher communication. A decrease in parent–teacher communication and parents' motivation to become involved with their children's day-to-day educational activities, such as assignments, homework, and attendance, are possible consequences if no research is done to support and increase the effectiveness of technology-based parent–teacher communication (Y. Sung, Chang, & Liu, 2016). The current study was conducted to close this gap in the literature.

Purpose of the Study

The purpose of this quantitative study was to examine the relationship between parents' average quarterly use of a parent portal and students' average quarterly English language arts (ELA) and mathematics grades at the third- through the fifth-grade level.

Research Questions and Hypotheses

In a research study, the research questions need to be clear, focused, concise, complex, arguable, and centered around a topic the researcher is genuinely curious and passionate about (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). The current study's topic was parents' quarterly use of a parent portal to communicate and the relationship between these communications and students' academic achievement at the Grade 3–5 level. The following research questions (RQs) and hypotheses were used to guide the study:

RQ1: Is there a relationship between the number of times parents initiate quarterly communication using a parent portal and students' English language arts average quarterly grades?

H_o1: The number of times parents initiate quarterly communication using a parent portal does not predict students' English language arts average quarterly grades.

H_a1: The number of times parents initiate quarterly communication using a parent portal predicts students' English language arts average quarterly grades.

RQ2: Is there a relationship between the number of times parents initiate quarterly communication using a parent portal and students' mathematics average quarterly grades?

H_o2: The number of times parents initiate quarterly communication using a parent portal does not predict students' mathematics average quarterly grades.

H_a2: The number of times parents initiate quarterly communication using a parent portal predicts students' mathematics average quarterly grades.

Theoretical Framework

The theoretical framework for this study was Bandura's (1977, 1997) social cognitive theory of self-efficacy, which is concerned with what a person believes they can do with their knowledge and skills in any given circumstance. According to the social cognitive theory of self-efficacy, if teachers feel comfortable with their technological skills, they may be more prone to use technology to communicate with parents. The social cognitive theory of self-efficacy (Bandura, 1977, 1997) was essential to this research because it addressed parent and teacher apprehensions about using a technology-based parent portal to communicate and improve students' academic achievement.

Nature of the Study

I used a quantitative nonexperimental cross-sectional design. Quantitative methodology is consistent with understanding the relationship between variables (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). A quantitative nonexperimental design is used to measure two or more variables that the researcher suspects may have a significant relationship (Warner, 2013). The current study addressed the relationship between parents' use of online communication (a parent portal) and students' academic achievement in a Southeast U.S. public school district's Grade 3–5 level. A simple bivariate linear regression was used to analyze archival data obtained from the school

district. Simple bivariate linear regression is a statistical procedure that includes one or more descriptive variables to predict the result of a response variable (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). Using a quantitative nonexperimental cross-sectional design is consistent with current research in the field of parent–teacher communication using technology-based tools (Blau & Hameiri, 2017; Can, 2016; Gu, 2017; Palts & Kalmus, 2015; Patten, 2017; Roman & Ottenbreit-Leftwich, 2016; W. Sung, 2016; Y. Sung et al., 2016).

Definitions

Variables

Dependent Variable 1: English language arts average quarterly grades

Dependent Variable 2: mathematics average quarterly grades

Independent variable: The number of times parents initiate quarterly communication using a parent portal

Terms

Parent portal: A web-based student information system that allows parents real-time access to their students' assignment information, grades, and attendance (PowerSchool, 2019).

Self-efficacy: What a person believes they can do with the knowledge and skills they have, under any circumstance (Bandura, 1977, 1997).

Technology-based systems: Online systems such as websites, parent portals, email, FaceTime, and Skype established by schools to engage in communication with families (Goodall, 2016).

Assumptions

I assumed that teachers accurately entered weekly and averaged ELA and mathematics quarterly grades using the PowerSchool system, as required by the Southeast U.S. public school district. Furthermore, I assumed that parents had the necessary technology tools and technical skills to access and use the public school district's online parent portal. These assumptions were necessary because the research questions and hypotheses addressed the relationship between the number of times parents initiated quarterly communication using an online parent portal and students' quarterly ELA and mathematics grades.

Scope and Delimitations

This study's focus was parent–teacher online communication using a parent portal to improve students' academic achievement. Technology-based parent–teacher communication was chosen for this study because a gap in the research exists concerning the relationship between parents' use of online technology-based parent portals and students' academic achievement. This study's target population was students attending school at the Grade 3–5 level in a fully accredited Southeast U.S. public school district.

To obtain the necessary data and ensure that each group within the population was equally represented, I used two types of sampling: convenience and stratified random. Convenience sampling is the process of selecting samples based on what is conveniently available to the researcher (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). Stratified random sampling, which is also referred to as probability sampling, is used to ensure that each group within a population is equally represented (Frankfort-Nachmias &

Nachmias, 2008; Warner, 2013). Although Bandura's (1977, 1997) social cognitive theory of self-efficacy was the framework for this study, Epstein's (2009) framework of six types of parent involvement was considered because of the communicating type of parent involvement in Epstein's framework. However, Epstein's framework did not involve technology-based means of communication.

Limitations

A potential limitation to this study was sampling. Two types of sampling were used in this study: convenience and stratified random. To address the sampling limitation and minimize the external threat to the validity of interaction of subject selection, I selected a school district where I was not employed.

Using archival data was another potential limitation of the study. Archival data, as defined by Jones (2010), are data collected by researchers and made available for other researchers to use. Archival data may not have included the precise information needed to address the research questions. To minimize the potential limitation of using archival data in this study, I used the most current archival data (i.e., the 2019-2020 school year first-, second-, and third-quarter data).

Significance

Parents, teachers, and schools agree it is imperative to create and maintain two-way technology-based communication to improve students' academic achievement (Goodall, 2016; Palts & Kalmus, 2015; Siti Fatimah et al., 2016). There are several ways to engage in parent–teacher communication using technology-based platforms (Goodall, 2016; Palts & Kalmus, 2015; Thompson et al., 2015). Careful consideration of parental

preferences and apprehensions should be addressed before implementing any technology-based source (Goodall, 2016; Palts & Kalmus, 2015; Thompson et al., 2015). The challenges of time, distance, and work schedules may prevent parents from engaging in face-to-face communications at a brick-and-mortar school with their child's teacher (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015). Technology may decrease the barriers parents and teachers face in their efforts to engage in important collaborations about improving student academic achievement (Goodall, 2016; Siti Fatimah et al., 2016).

The current study's potential relevance was to present information that expands the understanding of the relationship between parents' use of a technology-based online parent portal and students' academic achievement. Furthermore, results may be used to promote positive social change in the field of educational technology. This study was unique because it focused on the under researched area of the technology-based parent–teacher/school–home communications (see Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015; Siti Fatimah et al., 2016; Thompson et al., 2015). The results of this study could add to the body of knowledge about using technology-based online parent portals and how using a parent-portal could predict student achievement and support positive social change in the field of educational technology.

Summary

The development and modernization of information communication technology (ICT) such as parent portals, mobile technology, mobile apps, and websites give parents opportunities to engage in important conversations with teachers about the academic

achievement of their children (Blau & Hameiri, 2017; Gu, 2017; Heath et al., 2015; W. Sung, 2016; Y. Sung et al., 2016). However, a gap in the research exists regarding how parents are using technology-based parent portals to communicate about the education of children attending school, and how using these communications is related to students' academic achievement (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015; Patten, 2017). The selection of ICT can expand overall technology use at the school and increase communication, parental involvement, and students' academic achievement (Chena & Chena, 2015; Curry & Holter, 2015; Y. Sung et al., 2016; Thompson et al., 2015). Moreover, teachers' beliefs, practices, and self-efficacy about using technology can influence their willingness to use technology to engage in communications with parents about their children's academic achievement (Hsu, 2016; Kraft & Rogers, 2015; Ndongfack, 2015). Due to the limited research, more exploration of technology-based parent–teacher communication, the efficacy of parents and teachers in using technology tools, and the relationship between parents' technology use and students' academic achievement is needed (Goodall, 2016). In Chapter 2, a review of the current literature related to parents and teachers using technology-based platforms to communicate about children's academic achievement is presented.

Chapter 2: Literature Review

The rapid development of digital technology is affecting the interactions between home and school (Goodall, 2016; Palts & Kalmus, 2015; Thompson et al., 2015). Traditional communication methods such as monthly calendars, parent–teacher conferences, visits to the school, and letters are becoming an ineffective means of communicating with parents about their children's academic success (Natale & Lubniewski, 2018). Technology-based platforms such as parent portals are becoming parents' preferred method of communicating with their child's teacher and school regarding their children's academic achievement (Palts & Kalmus, 2015; Thompson et al., 2015). The united efforts of parents, teachers, and the school to employ technology-based communication is vital to the academic achievement of children because it allows for convenient interactions between parents and teachers (Goodall, 2016; Heath et al., 2015; Siti Fatimah et al., 2016).

To address the gap in existing literature regarding the relationship between parents' use of technology-based tools and students' academic achievement, further research is needed (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015). A decrease in parent–teacher communication and parents' motivation to become involved with their children's day-to-day educational activities, such as assignments, homework, and attendance, is possible if no research is done to address the effectiveness of technology-based parent–teacher communication (Y. Sung et al., 2016). The current study was conducted to close this gap in the literature.

According to Goodall (2016), there are considerable teacher time and financial costs related to using technology-based communication platforms. To provide the best possible evidence in support of the growing digital mode of home–school communication, more exploration in technology-based parent–teacher communication is needed (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015). In addition, due to the limited research on technology-based parent–teacher communication, there is a need to explore the efficacy of teachers' and parents' utilization of technology tools, and the influence of technology tools on students' academic achievement (Goodall, 2016).

Web-Based Student Information System

The web-based student information system (SIS) is a software application designed to provide information exchanges between students, parents, teachers, and the school administration. All aspects of student data are stored in the web-based SIS, such as attendance, grades, and demographics. The parent portal is one SIS feature that provides students and parents online access to teacher assignments and grades.

Home Base Parent Portal powered by PowerSchool is a web-based SIS that allows parents real-time access to their children's assignment information, grades, and attendance. The web-based SIS is part of a larger system by Home Base that houses every aspect of student data including demographics, grades, and attendance. All parents receive a parent portal access code at the beginning of each school year. They can use this information to register and use the parent portal web-based SIS to view their children's assignment information, grades, and attendance. Although the parent portal is available to all parents, registering and using the web-based SIS is optional. The gap

addressed in the current study was the relationship between parents' use of technology-based parent portals and students' academic achievement.

Literature Search Strategy

The search strategy used to collect pertinent articles for the literature review focused on pinpointing information related to several key terms: *parent–teacher communication, parental involvement, parental engagement, home–school relations, digital communication channels, parent portals, student academic achievement, motivation, self-efficacy, Bandura, social cognitive theory of self-efficacy,* and *communication self-efficacy*. I used the Walden University library website databases, including Education Source, ERIC, SAGE Journals, and ProQuest Central, to collect peer-reviewed studies. Although I used the Walden University library website education research (Walden University, 2019) page to search the literature, I also supplemented my search using Google Scholar. The initial search included articles outside the most recent 5 years, allowing me to mine valuable information from older articles. However, the literature search focused on sources published within the last 5 years. In addition, I used Zotero software to organize the articles collected for the literature review.

To gauge the significance of parent–teacher communication using technology-based platforms to improve student academic achievement, I organized the literature review into sections. I synthesized literature published on (a) the theoretical framework of Bandura's (1977, 1997) social cognitive theory of self-efficacy; (b) themes including parent–teacher communications and technology and parent–teacher communication challenges; and (c) subthemes of communication preferences, mobile technology parent–

teacher communication, information communication technology and parent–teacher communication, school website parent–teacher communication, mobile application parent–teacher communication, parent–teacher–school collaboration, and parent–teacher communication efficacy. This chapter concludes with a summary.

Theoretical Framework

I reviewed a technology-based online parent portal through the theoretical framework of Bandura's (1977, 1997) social cognitive theory of self-efficacy, also known as a social learning theory. Bandura is a leading social cognitive psychologist known for social learning theory and self-efficacy concept (Bandura, 2006). Bandura (1977, 1997) described *self-efficacy* as what a person believes they can do with the knowledge and skills they have, in any circumstance.

Self-efficacy is important to psychologists and educators because it has played a central role in humans' psychological, behavioral, and motivational actions (Bandura, 1995, 1997; Goodall, 2016; Willis, 2015). Bandura (1977) argued that joint communications between cognitive, behavioral, and environmental determinants embody social learning theory. These elements can influence whether people decide to engage in activities, such as home–school communications (Goodall, 2016; Willis, 2015).

Self-knowledge constitutes a major aspect of how people feel about their ability to perform and take part in their life's activities (Bandura, 1997). Bandura (1997) identified four principal sources of information that influence a person's beliefs about their self-efficacy: vicarious experiences (alter efficacy beliefs based on how people view and compare themselves with the accomplishment of others), enactive mastery experiences

(what a person believes they can accomplish), verbal persuasion (social influences based on capability), and physiological and affective states (uses dysfunction to account for their strength, vulnerability, and capableness). Moreover, Bandura proposed personal efficacy and constructing beliefs about personal efficacy are two separate functions that relate to the cognitive process of efficacy. Personal efficacy is related to the types of information people focus on and use as symbols that govern what decision they make (Bandura, 1977). Constructing beliefs about personal efficacy pertains to combining rules and trial and error methods to weigh and integrate efficacy information from different sources (Bandura, 1977).

Researchers have used Bandura's (1977, 1997) social cognitive theory to examine teachers' and parents' self-efficacy. For example, Willis (2015) examined teachers' self-efficacy, confidence, and technology skills and used Bandura's (1994) definition of self-efficacy as a platform to investigate how greater levels of self-efficacy produce greater levels of performance. Goodall (2016) also employed Bandura's (1977) concept of self-efficacy when examining the relationship between parents' engagement in their child's learning and school-home communication. Goodall reported that parents' engagement in their children's education depends on their belief in their ability to affect change. Although the social cognitive theory of self-efficacy was not the framework for Heath et al.'s (2015) multiple case study, the revelation of misperceptions and misalignments between parents and the school leadership cast doubt on whether the success of their children was the priority of the school. Heath et al.'s findings aligned with Bandura's

(1997) four principal sources of information that influence a person's belief about their self-efficacy.

The social cognitive theory of self-efficacy (Bandura, 1997) was essential to my research because it helped me understand parent apprehensions about using a technology-based parent portal to communicate and improve students' academic achievement. Among parents, self-efficacy to use a web-based parent portal was an indicator of parents' willingness to engage in the education of their child and teachers' willingness to create an environment that was family friendly and conducive to parent involvement (see Hsu, 2016; Roman & Ottenbreit-Leftwich, 2016; Willis, 2015). When a person believes in themselves, they are more likely to succeed in each task or goal they seek to obtain (Bandura, 1997). If teachers feel comfortable with their technological skills, they may be more prone to use technology to communicate with parents (Goodall, 2016; Hsu, 2016; Willis, 2015). Likewise, an inviting teacher–school atmosphere may motivate parents to take part in their children's education at the school and home level to increase students' academic achievement (Goodall, 2016; Hsu, 2016; Thompson et al., 2015; Willis, 2015).

Parent–Teacher Communication and Technology

Goodall (2016) examined multiple works of literature in the fields of technology, communication, and parental engagement. Goodall addressed technology-based systems (e.g., websites, parent-portals, email, FaceTime, and Skype) established by schools to engage in communication with families. Goodall's investigation revealed that many technologies were available. However, no single technology-based source of parent–teacher communication could be recommended due to insufficient knowledge regarding

these platforms, prompting the need for more research. Although there was a limited amount of research in the field of technology-based parent–teacher–school communication, Goodall discovered parental needs, ability to use, and availability to technology must be considered when choosing technology to establish home–school communications.

Communication Preferences

The school's preferred method of communicating between home and school may not be consistent with parents' viewpoints. In a mixed-methods study, Natale and Lubniewski (2018) investigated elementary school families' viewpoints and their preferred method of communicating with their child's teacher. The results showed inconsistencies between family and teacher communication expectations. For example, most families chose email or other technology methods as their preferred mode of communicating with their child's teacher and believed their child's teacher was accessible through technology. However, other parents preferred more traditional communication methods, such as bulletin boards, notes, or meetings. In a quantitative study, Palts and Kalmus (2015) collected data from 44 teachers and 39 parents to investigate teachers' and parents' attitudes concerning their digital communication channel preferences (e.g., parent portal, websites, email, social networks, text messaging). The findings showed both parents and teachers believed that digital technologies increased parent–teacher communication. For example, digital technologies provided regular school–home communication and improved children's socialization skills and academic achievement. In addition, Palts and Kalmus found that teachers and

parents believed digital communication provided faster opportunities to exchange relevant information between home and school.

Innovations may influence parent–teacher communication preferences in technology, such as smartphones. In a mixed-methods study, Thompson et al. (2015) collected data from 1,349 participating parents to investigate parents' preferred communication mode. The findings showed smartphones affected how parents and teachers communicated. There was a parental preference for email communication and other technology-based platforms, including text messaging, social media, and websites. For instance, parents could conveniently access their email using the smartphone device. In a related parental preference study, Chena and Chena (2015) examined how primary school parents accepted using a smart device while engaging in parent–teacher communication. Chena and Chena found parents' decisions to use technology to communicate was based on whether parents perceived the technology as useful toward helping their children achieve academic success rather than just the presence of a device.

Parent–teacher communication frequency can influence the relationship between home and school and the method of communication employed. In a quantitative study, Patten (2017) investigated how frequently 22 teachers communicated with parents using traditional methods (e.g., monthly calendars, parent–teacher conferences, visits to the school, and letters), technology tools (e.g., parent portals, email, and websites), and how the frequency of principals' automated telephone calls to parents influenced how often teachers and principals contacted parents. The findings showed three outcomes. First, teachers were novices at communicating with parents and infrequently called parents,

averaging 4 to 6 times a year. Second, senior teachers contacted parents more frequently than novice teachers. Third, principals' frequency and overuse of automated mass calling had a negative influence on parent–teacher communication. For instance, the parents agreed automated calling was an effective method of contacting parents. However, automated calling did not provide parents with one-to-one contact with their child's teacher.

Mobile Technology Parent–Teacher Communication

Smartphones may influence the way parents and teachers communicate and motivate families to become involved with day-to-day student educational activities such as assignments, homework, and attendance, thus influencing student achievement. W. Sung (2016) conducted a quantitative study to determine whether the digital divide related to smartphone use has grown or shrunk. The author used pre-existing data sets collected from the Media Panel Survey from 2010 to 2013. As defined by W. Sung, the *digital divide* is the ability of an individual to access and use digital devices, such as computers and the Internet. In addition, W. Sung referred to the digital divide as the gap among individuals who have access to digital devices, such as smartphones and those who do not. The findings showed that using digital devices, such as smartphones, influenced the way parents and teachers communicated and helped close the digital divide gap between individuals of varying incomes, occupations, age, and education levels. For instance, W. Sung found that the price of smartphones was cheaper than desktop computers. Smartphones' multifunctionality features, such as making phone calls, emailing, texting, and using the Internet, allowed all parents greater accessibility

than desktop computers to engage in parent–teacher communication about the education of their children (W. Sung, 2016). In a related study, Y. Sung et al. (2016) conducted a meta-analysis that examined 110 peer-reviewed studies published in the last two decades on mobile device usage in education. Y. Sung et al. found using mobile devices had a greater influence on students' academic achievement than using a desktop. For instance, mobile devices provided real-time access to information, instant communication, and feedback. Y. Sung et al.'s research findings are consistent with W. Sung's prior findings that digital devices, such as smartphone technology, influenced the way parents and teachers communicated and helped close the gap between individuals of varying incomes, occupations, ages, and levels of education.

Several researchers have investigated information flow and the influence of mobile technologies on parent–teacher communication. Blau and Hameiri (2017) conducted a quantitative data analytics study using data from 140 parents, 730 students, and 31 teachers collected from 429 schools. The data were extracted from the schools' databases. The purpose of the Blau and Hameiri's study was to examine how teachers, students, and parents used mobile device technology to access school educational databases. The findings showed the more teachers used mobile device technology to access school educational databases, the more students and parents used mobile device technology to access the school educational databases, exchange educational information, and communicate with the school. For example, during instruction (i.e., K-12 general education curriculum), the teachers showed students how to enter and update data (i.e., assignments, grades, attendance) using mobile devices. The students learned new ways to

communicate about their education using mobile device technology. The students shared their learnings with their parents to increase parental communication between home and school using mobile device technology. In a related quantitative study, Ozdamli and Yildiz (2014) surveyed 790 parents to examine parental expectations about increasing parent-school collaborations using mobile technologies. Ozadamli and Yildiz's findings were consistent with Blau and Hameiri's research results. Parents had positive expectations about using mobile technologies and used cell phones, laptops, and especially smartphones to improve parent-school collaborations (Blau & Hameiri, 2017; Ozadamli & Yildiz, 2014) .

Parental use of technological devices and media showed promise as a strategy to produce better parent–teacher communication. In Sad, Konca, Ozer, and Acar's (2016) phenomenological study, the authors collected data from 23 parents intending to investigate the outcomes of using electronic parental involvement or *parental e-nvolvement*. Findings from the parents' interviews revealed that they used various technologies in their families but principally the Internet, smartphones, computers, and tablets. Electronic parental involvement proved to be a valuable technology communication method for engaging parents and teachers in communications about children's academic achievement. For instance, using electronic parental involvement enabled parents to help their children with homework, research projects, and studying.

Parents were able to supervise the educational and social activities of their children. Sad et al. (2016) discovered using technology-based methods such as electronic parental involvement was a good strategy for engaging in communications with parents

about the academic achievement of children attending school. Similarly, in a quantitative study, Palts and Kalmus (2015) examined parent and teacher beliefs about using digital technology. Palts and Kalmus discovered digital technologies provided regular school-home communication, helped with children's socialization skills, and student academic achievement.

School manager preferences may influence the method of parent–teacher communications. In a qualitative study, Sabanci, Cimili Gok, and Ozyildirim (2017) examined eight school managers' electronic communication preferences (i.e., principals) to determine contact preferences in private versus state school environments, reasons for their choices, and to plan communication choices in the future. The findings showed computers and mobile phones were the most common form of electronic communication school managers used. The school managers' preferences were contingent on the audience (superiors, teachers, parents, students). Sabanci et al. (2017) discovered to encourage parents, teachers, and managers to use electronic communications, educational institutions provided safe, diverse programs, and technologies that promoted using electronic communications.

Patrikakou's (2016) article examined the literature and provided an overview of the growing access to technology and ways technology and online media influenced interactions between home and school. In addition, Patrikakou's article discussed ten principles of good parenting in a technology world, identified in the literature, such as monitoring children's computers and being a part of your child's online life. According to Patrikakou's overview of the literature, several researchers reported that technology and

online media positively and negatively influenced family interactions with the school and parent involvement. For example, Patrikakou discovered in the literature that school website technology kept parents abreast of school activities. Patrikakou's overview of the literature found that through the use of digital technologies and media in the school, the learning continuum between home and school was strengthened. Parents were informed about their children's school activities.

The adoption of mobile technology is a method for parents to engage their children in learning at home and communicate with their child's teacher. In a mixed method explanatory research design study, Eutsler (2018) collected data through surveying 120 parents and interviewing 13 other parents. Eutsler also used the unified theory of acceptance and use of the technology adoption model (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003) to explain the parents' intention to adopt mobile technology. Eutsler's purpose was to examine the intention of the parents to adopt mobile technology. The findings showed parents agreed that adopting mobile technology was a practical approach to help children complete school assignments, such as reading at home. However, the parents' perceptions about adopting mobile technology centered on whether and how well their elementary (K-5) children used mobile technology. In addition, Eutsler's analysis identified three types of parent mobile technology users: (1) Reluctant (concerned with media-safe technology); (2) Indifferent (perceived technology as entertainment); and (3). Eager (embraced mobile technology and saw it as a positive influence in the education of their child). Eutsler found creating a collaborative

partnership between home and school that recognized and understood parents' perception of using mobile technology improved parent–teacher communication.

Teachers' use and perception of communication and mobile information technology can determine whether they use technology-based tools to communicate with students and parents about students' academic achievement. In a quantitative study, Biddix, Chung, and Park (2016) examined the perceptions of 59 university faculty members from two countries and their use of mobile information communication technology (m-ICT) for teaching practices. Data were collected using a questionnaire designed by Biddix et al. (2016) that included m-ICT usage, demographic information, ratings for the use of m-ICT related to specific activities, and open-ended questions about specific activities. Although the findings showed faculty members used similar m-ICT devices in both countries, notable differences centered on communication between faculty and students and instructor content. For example, the students in one country showed more confidence in their m-ICT use than the other country's students since using mobile devices was a regular part of their everyday lives. In addition, Biddix et al. found cultural differences such as chatting and asking questions in class were factors in how the faculty members perceived and used m-ICT.

Information Communication Technology and Parent–Teacher Communication

The selection of ICT, such as parent portals, smartphones, and social media, can expand overall technology use at the school and increase communication, parental involvement, and improve student academic achievement. Heath et al. (2015) conducted a multi-case study to examine 11 parents and three principals from three different

elementary schools on the efficacy of technology-based home–school communication. Heath et al. collected data through multiple sources, including interviews, school websites, and parent opinion polls. Results showed misperceptions between parents and principals about ICT adoption beliefs and actual use of ICT. For example, based on interviews, some principals claimed to be early ICT users, while demonstrating limited ICT use. In a similar study, Razak, Jalil, Krauss, and Ahmad (2018) examined the conditions and importance of the successful implementation of ICT integration within schools. The nine participants included ICT coordinators, teachers, and principals from nine different schools. The findings showed three conditions guided the successful implementation of ICT integration within the schools: (1) the type of ICT tools; (2) rules and regulations; and (3) individuals assigned to implement the ICT programs such as coordinators and instructional program department heads. Using current and varied forms of technology between the home and school opened pathways for communication (Heath et al., 2015; Razak et al., 2018).

Parental engagement patterns may influence the method of parent–teacher communication. Forty-two primary school parents participated in Palts and Harro-Loit's (2015) qualitative study. Palts and Harro-Loit's purpose was to examine whether parental communication patterns influenced the frequency and communication method used to interact with their child's teacher. The findings showed parents with frequent communication patterns with their child's teachers regularly contacted the school and were likely to use multiple communication forms such as email, telephone, personal conversations, and group meetings. Whereas parents with non-frequent patterns of

communication with their child's teachers, only contacted the school when there was a behavior problem. Palts and Harro-Loit discovered that through the analysis of the six parents' focus groups, some parents identified the lack of information technology (IT) access. The knowledge and skills to use IT influenced their level of communication patterns. These findings are consistent with Goodall's (2016) research that found access to technology and the ability to use the technology were factors that determined the frequency and method of parent–teacher communication.

Managing ICT may present challenges to teaching, learning, and communicating between home and school as schools implement new technologies. In a qualitative study, Mihal and Nieuwenhuis (2015) investigated the managerial challenges associated with new technologies such as an interactive whiteboard (IWB) regarding the introduction, acceptance, and management of ICT in 6 schools. The participants included a member of the school governing body, principal, project leader, head of departments, staff members, administrative officer, and a member of the department of education for each school. Mihal and Nieuwenhuis' findings showed finance, teacher shortages/absenteeism, teacher training, transportation, Internet/electricity, and accountability to stakeholders posed challenges for principals integrating new technologies in their schools. Although the IWB technology was riddled with managerial challenges, clearly defining management roles eliminated conflict, stress, and confusion for the school management team.

Using ICT, such as desktop computers, laptops, and tablets at school may positively impact home–school communication, teaching, and learning. In a quantitative study, Ferraro (2018) examined whether using ICT (i.e., computer, laptop, tablet) had an

impact on education and knowledge, specifically mathematics test scores. The author used pre-existing data obtained from the 2012 Programme for International Students Assessment. The findings showed students who used ICT improved their mathematics test scores. For instance, students who used ICT were almost 16 times more likely to do better on their mathematics tests in areas such as how geometric objects can change than students who did not use ICT.

School Website Parent–Teacher Communication

The intentional development of school websites can heighten communications between parents and teachers. In a qualitative study, Taddeo and Barnes (2016) examined how managers of 30 schools used their websites to communicate with their audiences about teaching-learning portals, support administrative operations, and marketing platforms. The results showed school websites provided great opportunities for stakeholders to participate with the school, showcase its strengths, facilitate communication, and exchange information and ideas. However, there were considerable costs to develop and maintain a website that addresses its stakeholders' needs and increases student academic achievement. Despite the cost, Taddeo and Barnes found the value educational institution websites provided outweighed the cost, and some expenses can be outsourced.

The essential features of teacher-made school websites to facilitate parent–teacher communication may not align with parent perceptions of what features to include to facilitate communications between home and school. In a quantitative study, Roman and Ottenbreit-Leftwich (2016) collected and analyzed data from 20 different elementary

school teacher-made websites. Roman and Ottenbreit-Leftwich's purpose was to examine what essential features parents and teachers believed should be included on teacher-made websites to facilitate communications between home and school. The results of Roman and Ottenbreit-Leftwich's study revealed less than half (8 of 20) of the essential features parents and teachers desired were present in the websites they analyzed. For instance, the lack of essential website features such as parent portals, and event and academic calendars made it difficult for users to engage in communications between home and school. In a similar quantitative study, using a content analysis approach, Gu (2017) examined what relevant content information was presented for parental use on local schools' websites and how the information was designed to increase parent–teacher communication. Gu examined twelve K-9 school websites from three different municipalities. Gu used Epstein's (2009) six components of parental involvement (parenting, communicating, volunteering, learning at home, decision making, collaborating with the community) to analyze the school website settings. In addition, Gu used website evaluation metrics to evaluate website design features. The findings showed the school websites provided limited information about program activities, support services or resource information, curriculum, and students' learning and progress. For example, school websites need to include features that provide communication strategies that support improving teaching and learning quality. Gu's findings were consistent with Roman and Ottenbreit-Leftwich findings that essential items such as event and academic calendars and parent portals are needed to establish a website that is easy for users to engage in communications between home and school.

The day-to-day management of school websites influences whether parents and teachers use technology tools to communicate about student academic achievement. In a qualitative study, Alvarez and Ines-Garcia (2017) interviewed ICT coordinators at six primary schools to investigate school websites' day-to-day management. The findings showed school websites were crucial communication tools. The coordinators' interviews revealed the responsibility they believed was placed on them to update school websites to facilitate communications between home and school. Alvarez and Ines-Garcia found managing a school website was filled with challenges and opportunities for improvement, such as providing information on school activities, updating school events, and generating new communication avenues with the school community. Although Alvarez and Ines-Garcia's findings emphasized the importance of maintaining and updating school websites regularly, coordinators expressed how demanding it was to keep up with teachers' daily demands to update information such as photos and classroom news items. Alvarez and Ines-Garcia's findings are consistent with Gu (2017) and Roman and Ottenbreit-Leftwich's (2016) findings that essential items such as event and academic calendars and parent portals are needed to establish a website that is uncomplicated for users to engage in communications between home and school.

Mobile Application Parent–Teacher Communication

Using mobile applications (apps) communication between home and school can be an essential method to increase parental engagement and children's academic success. In a quantitative study, Can (2016) collected data from 573 parents to examine parents' views on using apps to communicate with their child's teacher. Can defined mobile

applications as a software program specifically designed to run on a mobile device (i.e., smartphone). The findings showed that although parents and teachers were accustomed to using traditional communication methods such as a school diary or communication book, parents were satisfied with using mobile apps to communicate with their child's teacher. For instance, parents and teachers believed mobile apps technology provided effective parent–teacher relationships, ease of information flow between home and school, and established cooperation between parents and teachers. In a similar study, Palts and Kalmus (2015) found digital technologies significantly influenced parent–teacher communications. Considering school parent portals (e.g., Home Base PowerSchool Parent Portal) are apps embedded in school websites, mobile apps technology allowed parents and teachers quick and easy real-time access to student assignment information, grades, and attendance (Can, 2016; Palts & Kalmus, 2015).

Using apps instead of paper-pencil methods to communicate with parents is a strategy teachers may use to impart information with parents about their child's behavior. Krach, McCreery, and Rimel (2017) conducted an exploratory quantitative study to determine how behavioral data was collected and tracked for 169 students by teachers at a Title I elementary school. The findings showed teachers charted behavior in one of three ways: 1. using a computer-based system named ClassDojo (2015), a free positive behavior classroom management system; 2. utilizing an individual system, or 3. using no system. In addition, Krach et al. (2017) found ClassDojo was the most popular method of charting student behavior. However, teachers identified notes sent home and pencil paper

methods of charting students' behavior. Krach et al. also found teachers infrequently tracked positive behaviors.

Some research focused on the development of apps to address traditional methods of parent–teacher communications. Razak et al.'s (2016) quantitative study centered on developing and testing the 360-Class monitoring app, which provided a platform for teachers to post assignments that could be reviewed by students and parents to monitor students' academic progress. Razak et al.'s main focus of the study and reason for developing the 360-Class Monitoring mobile application was to address challenges related to using traditional methods of parent–teacher communications such as torn, forgotten, and lost papers. Razak et al. compared several similar existing technology-based systems (i.e., school portal, social media, mobile apps) created to support communication between parents, teachers, and students through functionality, compatibility, and usability testing. Razak et al. tested the 360-Class Monitoring mobile application on three virtual devices (Google Nexus 4, Samsung Galaxy S3, and HTC Evo). The findings showed the 360-Class monitoring application performed best using the Google Nexus 4-android version 4.1.1 API 16. Moreover, the application provided an alternate method of parent–teacher communication using mobile device technology. For instance, teachers can use the app to post information about homework or projects for students and parents. In a comparable study, Sad et al. (2016) investigated the outcomes of using an electronic parental involvement (i.e., e-nvolvement). Sad et al. found mobile technology applications enabled parents to help their children with homework, research projects, and studying.

Many educational apps exist to further student academic achievement. However, the teacher's perception of mobile technologies may determine which apps he or she uses to engage students and communicate with parents. In a quantitative study, Domingo and Garganté (2016) examined survey data collected from 102 primary school teachers from 12 different schools. Domingo and Garganté's purpose was to investigate how teachers perceived mobile technology's influence on learning and specific apps used in the classroom. The findings showed the teachers' perception of how useful mobile technology influenced learning (e.g., information access and increased involvement in the learning) was related to apps such as content learning, learning skills, and informational management selected by the teacher. In addition, Domingo and Garganté found mobile technology provided easy access to instructional information and increased student involvement in the learning. According to Blau and Hameiri (2017), students learned new ways to communicate about their education using mobile device technology. The students could share their learnings with their parents to increase parental communication between home and school using mobile device technology.

Parent–Teacher Communication Challenges

Technology can reduce challenges that prevent parents and teachers from engaging in communication, teaching, learning, and student academic achievement. In a quantitative study, Ozmen, Akuzum, Zincirli, and Selcuk (2016) surveyed 806 primary school teachers from 21 schools. The purpose of the study was to identify the barriers that interfered with parent–teacher communication from teachers' viewpoints. The findings showed a lack of technology, time, distance, negative school experiences, cultural

differences, trust between parents, teachers, and managers, and economics were barriers that interfered with parent–teacher communications. For instance, teachers should not assume parents have access to technologies such as the Internet. Ozmen, Akuzum, Zincirli, and Selcuk discovered decreasing technology barriers could increase parent–teacher communication and improve student academic achievement.

In a similar qualitative study with headteachers at 29 primary schools as participants, using semi-structured interviews, Hornby and Blackwell (2018) examined factors such as parent-teacher, parent and family, societal factors, and Internet access that may interfere with parent–teacher communications. Hornby and Blackwell's findings were consistent with Ozmen et al.'s (2016) findings that the lack of technology tools such as the Internet limited communication opportunities between home and school. Goodall (2016) found that using digital communications was a practical approach to diminish barriers associated with parent–teacher conversations and help close the gap between home–school contacts.

A family's economic status can influence parent–teacher communications. In a quantitative study, Wang, Deng, and Yang (2016) used questionnaires to collect data from parents of seventh and eighth-grade students from 53 city schools. Wang et al. wanted to investigate how a family's economic status influenced their ability to engage in their children's education. The findings showed family beliefs and perceptions related to their children's educational activities (e.g., parent–teacher conferences, homework, seminars for parents, and volunteering at school) were linked to economic hardship stressors such as low income and educational levels of the mother. For instance, families

with highly educated mothers had greater parental involvement than families with mothers that were not highly educated.

In a related quantitative study that used 240 high school parents as participants, Davidovitch and Yavich (2015) examined the relationship between gender, income, community, and the level of the parent's education as to whether these factors influenced parents' abilities to engage in the education of their children. Davidovitch and Yavich's findings showed females are more active in the education of their children's learning than males. Family economics status (measured by parent-reported household annual income) played a crucial role in deciding whether parents communicated with their child's teacher and contributed to the list of challenges associated with parent–teacher communication (Davidovitch & Yavich, 2015; Wang et al., 2016).

Researchers have investigated parent-school partnerships and its importance to the overall educational well-being of children attending school. In a qualitative phenomenological study, Ratliffe and Ponte (2018) examined parents' experiences and their interactions with their children's schools. The participants were 12 parents from 12 different schools. The findings showed parents believed education was important for their children and valued parent-school relationships. In addition, the authors found the method of parent–teacher communication was important to the parents. For instance, parents expressed their appreciation that teachers were available via email and had personal and school websites, where parents had access to homework and weekly learning activities. Although the parents valued education and believed it was important

for their children, Ratliffe and Ponte discovered multiple barriers that limited family participation, such as language, work schedules, and family health issues.

In a related qualitative study that explored barriers and solutions to improve family engagement, Baker, Wise, Kelley, and Skiba (2016) examined barriers/limitations to families attending school events and what different approaches could be taken to increase family involvement. Fifty parents and 76 staff members from six different schools participated in Baker et al.'s (2016) research study. The findings showed five themes emerged, familiar to parents and school staff members (parent involvement opportunities, improving communication, welcoming families into the school building, time conflicts, and moving from parent involvement to parent engagement). Regarding the improved communication theme, Baker et al. found several schools had online systems that included parent portals where parents could stay informed about their children's progress. In addition, Baker et al. found parents and teachers identified barriers and solutions to resolve the obstacles to improving family engagement, including using technologies such as parent-portals.

Parent, Teacher, and School Collaboration

The collaboration of parents, teachers, and the school may increase parent–teacher communication and student academic achievement. In a qualitative study, Baeck (2015) interviewed 40 teachers from seven schools. The study aimed to examine teachers' perspectives as it related to engaging in parent–teacher communication. The findings showed teachers viewed parents as threatening and believed institutional leaders needed to reserve a specific time for parent–teacher collaboration. For example, teachers felt

school leaders should develop a parent–teacher communication plan that outlined the expectations of the relationship between the teacher, school, and parents. In a similar study, Gartmeier, Gebhardt, and Dotger (2016) examined teachers' abilities to master challenges arising from speaking with parents. Gartmeier et al. found through interviews that parents viewed their interactions with teachers as ineffective since teachers did not provide sufficient time to address parental concerns. Baeck and Gartmeier et al.'s research findings confirmed the need for collaboration between home and school to build trust between the stakeholders and increase student academic achievement.

The habitual behaviors of teachers can influence the collaboration efforts between home and school and student academic achievement. In a qualitative study about how teachers shape their interactions with parents, Egger, Lehmann, and Straumann (2015) conducted interviews with 39 teachers and headmasters from 10 different primary schools. The results showed tension and ambivalence best described the relationship between parents and teachers, with the teachers clinging to their habitual behaviors that bordered on a lack of professionalism when communicating with parents. For example, school and home are considered two separate institutions, existing side by side, where teachers are in charge, and parents are not welcomed. Teachers systematically complete the yearly required parental contacts, placing little value on engaging in parent–teacher communication (Egger et al., 2015). According to Egger et al.'s research findings, teachers' habitual behaviors are indicators of the disconnection between home and school and the need for better parent–teacher communication to increase student academic achievement.

The lack of adequate pre-teacher preparation to collaborate between home and school can create barriers to a successful parent–teacher relationship. In a quantitative study, Alanko (2018) used surveys to collect data from 11 university personnel, including managers of a teacher education program and education professors, to assess how parent–teacher cooperation was covered in their university pre-teacher education program. The findings showed the program managers perceived their pre-service teacher graduates as competent and somewhat competent to engage in parent–teacher communication. According to Alanko, program managers identified teacher preparation modules that contained themes such as parent–teacher meetings, parental involvement, and producing newsletters for parents as the source of preparing its teacher candidates for successful communication with parents. Alanko discovered the managers perceived the modules should be developed to allow teacher candidates to practice their parent–teacher communication skills during their practical training to best prepare teacher candidates to communicate with parents.

Parent and Teacher Communication Efficacy

Social networks may influence parents' ability to communicate with their child's school and become involved in the learning. In a qualitative study with elementary school parents as participants, Curry and Holter (2015) investigated the relationship of social networks (i.e., interactions with other parents in the school) and how these connections influenced parents' perceptions about their role in the education of their children and parents' efficacy to satisfy the perceived role. The findings showed parents saw themselves as highly involved with the school. The parents believed that the value of

networking with their peers surpassed the importance of traditional or technological communication methods with their child's teacher. For example, parents arrived at school approximately fifteen to twenty minutes early to talk with other parents about how to communicate with teachers and administrators. According to Curry and Holter, parents perceived social networking relationships with other parents as important to close the gap between home and school.

Curry and Holter (2015) discovered parents were more likely to become involved with their child's school when they knew at least one parent who was also involved. In a related study, Rodriguez, Blatz, and Elbaum (2014) interviewed 96 parents in 18 schools to examine the parents' perceptions about their ability or inability to become involved with their children's education and communicate with their child's teacher. The findings showed parents perceived the schools were not inviting. Teachers were not addressing the parents' primary concerns, and parents did not feel comfortable participating in their child's education. For instance, parents felt the school could do a better job of providing services for students with disabilities and feedback on their children's progress. In a related qualitative study that used email exchanges, interviews, observations, and documentation to explore the perspective of two parents and two teachers concerning home–school communication about children with disabilities, Chu (2014) found cultural sensitivity, two-way communication, and teacher availability were barriers to parent–teacher communication. For example, parents perceived teachers as insensitive to cultural differences, lacked the skills and knowledge to address students' needs with disabilities, and needed the training to provide the best services for children with disabilities.

The opinions of teachers regarding parent involvement are important to secure a successful home school connection. In a qualitative case study, Aslan (2016) examined six primary public school teachers' opinions regarding their perceptions of parent involvement in school. A data content analysis technique was used to analyze the data obtained from semi-structured interviews, parent–teacher meeting minutes, and demographic information forms. The finding showed teachers viewed their overall relationship with parents as unfavorable. For example, teachers saw parents as lacking the skills and attitude to engage in a high-quality two-way dialogue.

In a related study, Santiago et al. (2016) explored how the demographic variables of parent trust, parent involvement, and student behavior influenced the parents' level of involvement. The authors used surveys to collect data from 212 kindergartens through fourth-grade teachers from four different elementary schools. The findings showed, parent trust, involvement, and parents' perceptions of their child's behavior were predicated on whether the student received free or reduced lunch. Santiago et al.'s (2016) findings are consistent with Alsan's findings that demographics influence whether parents are communicating with the teacher and engaged in the day-to-day activities at the school using technology-based tools such as parent portals. In a similar study, Egger et al. (2015) found teachers' habitual behaviors were indicators of the disconnection between home and school and the need for better parent–teacher communication to increase student academic achievement.

Parent–teacher conferences can provide communication opportunities for home and school to engage in conversations that promote student academic progress. However,

many teachers may not possess the skills needed to participate in this professional activity. Using experienced and novice teachers, Walker and Legg (2018) investigated the effects of four teachers applying a simulated parent–teacher conferencing program to promote parent–teacher communication skills to increase family engagement. The findings showed teachers with and without experience could benefit from simulation programs to communicate with parents during parent–teacher conferences. Even though engaging in parent–teacher conference simulation programs helped teachers develop strategies to conference with parents, Walker and Legg found time and cost factors limited teachers from participating in simulator training. In a similar study, that included 1,417 ninths through twelfth-grade students and their parents from 30 high schools, Kraft and Rogers (2015) investigated how using a light-touch communication intervention program (i.e., the teacher sends a weekly message to the parents about the progress of their child) increased parent involvement and student academic achievement. The findings showed the light-touch communication intervention program was equal or comparable to other educational interventions and demonstrated the potential for developing policies to increase parent–teacher communication and student academic achievement.

Engaging in technology professional development may provide teachers with the skills needed to feel successful using technology such as parent portals to communicate with parents. In a mixed method study, Blanchard, LePrevost, Tolin, and Gutierrez (2016) examined 20 middle school teachers' beliefs and practices related to teachers participating in technology-enhanced professional development (TPD). The findings

showed some changes in the teachers' beliefs and practices. However, Blanchard et al. (2016) reported there was no overall statistically significant change in teachers' practices, as measured by the Reformed Teacher Observation Protocol (RTOP), their instructional disapproval, or their self-efficacy, about the specific subject they taught. In a related teacher technology professional development quantitative study, Ndongfack (2015) wanted to improve upon an existing professional development model. The findings showed teachers preferred a school-based professional development that was on-going, characterized by collaborative learning, problem-solving, and classroom follow-ups. Blanchard et al. and Ndongfack's research studies showed that teacher beliefs and practices are influenced by technology professional development.

Teachers' beliefs, practices, and self-efficacy about using technology can influence their willingness to use technology to communicate with parents about their children's academic achievement. Willis (2015) conducted a quantitative study to examine pre-service teacher candidates' self-efficacy levels enrolled in scaffolded technology training related to their perceived confidence to utilize technology. Four hundred twenty-four pre-service teacher candidates completed the Technology and Teaching Efficacy Scale. The findings showed that completing technology training impacted whether teachers used technology and their teaching self-efficacy. Survey results showed at the end of the training, incremental introduction of technology skills reduced the feeling of panic and uncertainty about using technology among the pre-service teacher candidates (Willis, 2015).

In a related mixed method study about teacher technology self-efficacy, Hsu (2016) investigated current beliefs, practices, and barriers of elementary school teachers, regarding their technology self-efficacy. Hsu collected data through interviews, observations, and online surveys from 152 teachers. The findings showed that most of the teachers held a constructivist teaching belief (i.e., constructs new ideas or concepts based on their current or past knowledge) about using technology. According to Hsu, teachers with a constructivist teaching belief demonstrated high self-efficacy viewpoints concerning technology and a positive outlook towards using technology. Whereas teachers doubtful about their self-efficacy possessed a negative outlook toward using technology. Since Hsu found teachers with high self-efficacy had a positive outlook towards using technology, the implication for engaging in parent–teacher communication using parent portals is high.

Including problem-solving concerns will help achieve effective parent–teacher communications. Azad, Kim, Marcus, Sheridan, and Mandell (2016) conducted a qualitative study that included 18 teachers and 39 parents of children with autism spectrum disorder (ASD). The authors' purpose was to investigate what problem-solving strategies teachers and parents of children with ASD used when allowed to express a student-related concern. Azad et al. (2016) collected and analyzed data from the participants using surveys and observations. The findings showed parents and teachers demonstrated limited core elements of problem-solving behaviors. Although teachers and parents demonstrated limited core elements of collaborative problem-solving related to children with ASD, teachers demonstrated more core elements of problem-solving

behaviors than parents. Azad et al. also discovered parents and teachers reported engaging in more problem-solving strategies than was noted during the observations.

Summary

The literature confirms that positive parent–teacher relationships benefit a student's academic achievement (Goodall, 2016; Palts & Kalmus, 2015; Patrikakou, 2016; Thompson et al., 2015). However, a gap in the research exists concerning the impact of parents' and teachers' use of online technology-based parent portals to communicate about the education of children and its' relationship to student achievement (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015; Patten, 2017). This review of the literature supports the need for research about technology-based, parent–teacher communication and the self-efficacy of parents and teachers to utilize available technology tools to improve student academic achievement (Alanko, 2018; Sad et al., 2016; W. Sung, 2016; Taddeo & Barnes, 2016; Willis, 2015).

The development and modernization of ICT such as parent portals, mobile technology, mobile apps, and websites give parents high availability and opportunities to engage in meaningful conversations with teachers about the academic achievement of their children (see Blau & Hameiri, 2017; Gu, 2017; Heath et al., 2015; W. Sung, 2016; Y. Sung et al., 2016). Whereas traditional methods of parent–teacher communications such as school newsletters, calendars, and notes are ineffective since these items require children to transport them to and from school (Goodall, 2016; Patrikakou, 2016; Razak et al., 2016). Moreover, items related to traditional communication methods with parents are often left at school or lost along the way to and from home and never reach their

destination (Goodall, 2016; Patrikakou, 2016; Razak et al., 2016). Thus, creating a breakdown in the communications between home and school.

Parent–teacher communication can be achieved through multiple methods that include traditional and technology-based sources (Goodall, 2016; Natale & Lubniewski, 2018). The use of technology-based sources as a method of parent–teacher communication between home and school to improve student academic achievement is echoed throughout this literature review (Blau & Hameiri, 2017; Can, 2016; Eutsler, 2018; Goodall, 2016; Gu, 2017; Heath et al., 2015; Natale & Lubniewski, 2018; Palts & Kalmus, 2015; Patrikakou, 2016; Y. Sung et al., 2016; Thompson et al., 2015). Furthermore, this literature review focused on two themes (parent–teacher communication and technology and parent–teacher communication challenges) and seven **s**ub-categories (communication preferences, mobile technology parent–teacher communication, ICT and parent–teacher communication, school website parent–teacher communication, mobile application parent–teacher communication, parent-teacher-school collaboration, and parent and teacher communication efficacy).

Parent–teacher communication between home and school is the foundation for student achievement, regardless of the method used (Baeck, 2015; Goodall, 2016; Natale & Lubniewski, 2018; Patrikakou, 2016; Patten, 2017). However, the emergence of technology has created fast and efficient ways to communicate between home and school (Palts & Kalmus, 2015; Razak et al., 2016; Sabanci et al., 2017). The selection of ICT, such as parent portals, smartphones, and social media, can expand overall technology use at the school and increase communication, parental involvement, and improve student

academic achievement (Chena & Chena, 2015; Curry & Holter, 2015; Y. Sung et al., 2016; Thompson et al., 2015). Mobile technology such as smartphones allows parents to communicate with the school from any location (Blau & Hameiri, 2017; W. Sung, 2016; Y. Sung et al., 2016; Thompson et al., 2015). Moreover, many mobile applications are available for mobile technology devices designed to provide two-way exchanges (Can, 2016; Eutsler, 2018; Krach et al., 2017). These exchanges can be used to engage in quick and easy communications between home and school to support parent involvement and improve student achievement (Ozdamli & Yildiz, 2014; Sabanci et al., 2017; Sad et al., 2016). In addition, school websites that showcase a school's strengths, facilitate communication, and exchange information and ideas, are easily accessible using mobile technology (Alvarez & Ines-Garcia, 2017; Gu, 2017; Roman & Ottenbreit-Leftwich, 2016; Taddeo & Barnes, 2016). For example, parent portals, which provide links for parents to get additional information about their children, are embedded in school websites. Although this literature review has shown the swift and efficient use of technology-based sources to communicate between home and school, parent–teacher communication is influenced by challenges such as a parent, teacher, and school collaboration and parent–teacher communication efficacy (Baker et al., 2016; Hornby & Blackwell, 2018; Ozdamli & Yildiz, 2014; Ozmen et al., 2016; Ratliffe & Ponte, 2018; Wang et al., 2016).

Considering the importance of parental involvement in children's education, parents, teachers, and schools' collaborative efforts can determine children's overall success (Egger et al., 2015; Gartmeier et al., 2016). Moreover, teachers' beliefs,

practices, and self-efficacy about using technology can influence their willingness to use technology to engage in communications with parents about their children's academic achievement (Hsu, 2016; Kraft & Rogers, 2015; Ndongfack, 2015). Although several challenges that can hinder home–school collaboration that includes time and work schedules, parents and teachers may have different perceptions about their collaborative roles (Egger et al., 2015; Gartmeier et al., 2016; Ozmen et al., 2016). For instance, some teachers viewed their overall experience with parents as negative and often saw parents as threatening, while parents viewed schools as uninviting and teachers as ineffective and only contacting parents to address behavior problems (Baeck, 2015; Egger et al., 2015; Gartmeier et al., 2016). Technology-based sources are swift, efficient, and convenient ways to communicate between home and school (Goodall, 2016; Patrikakou, 2016). Using technology tools to communicate between home and the school can provide multiple opportunities for parents and teachers to build home–school relationships and increase student academic achievement (Can, 2016; Natale & Lubniewski, 2018; Razak et al., 2018; Santiago et al., 2016).

The literature reflects qualitative, quantitative, and mixed methods research studies that investigated using technology-based parent–teacher communication (Blau & Hameiri, 2017; Can, 2016; Eutsler, 2018; Natale & Lubniewski, 2018; Palts & Kalmus, 2015; Sabanci et al., 2017; Sad et al., 2016; W. Sung, 2016; Thompson et al., 2015). Several research findings showed parents had a preference for technology-based parent–teacher communications such as parent portals, mobile technologies, websites, apps, email, and social media instead of traditional methods of communicating with their

child's teacher such as newsletters, notes, phone calls, and parent–teacher conferences (Chena & Chena, 2015; Curry & Holter, 2015; Palts & Kalmus, 2015; Razak et al., 2016; Sabanci et al., 2017; Y. Sung et al., 2016; Thompson et al., 2015). In addition, the literature research findings showed many teachers and school administrators had low self-efficacy as it related to using technology and could benefit from technology professional development and strategies for engaging in conversations that address the needs of the parents (Alanko, 2018; Blanchard et al., 2016; Domingo & Garganté, 2016; Gartmeier et al., 2016; Ndongfack, 2015). For instance, parents have busy work schedules which can cause them to have to choose between work and engaging in the day-to-day educational activities at their child's school (Goodall, 2016; Natale & Lubniewski, 2018; Patrikakou, 2016; Razak et al., 2018; Santiago et al., 2016). Therefore, schools need to consider that parents work and need the school to be flexible when scheduling school activities to allow parents some latitude to participate in their child's school activities (Goodall, 2016; Patrikakou, 2016). However, due to the limited research, more exploration in the field of technology-based parent–teacher communication, the efficacy of parents and teachers to utilize technology tools, and its influence on student academic achievement is needed. In Chapter 3, I discuss the research design and rationale of the study, the methodology of the study, and the threats to the validity of the study.

Chapter 3: Research Method

Traditional communication methods, such as monthly calendars, parent–teacher conferences, visits to the school, and letters, have been identified as ineffective communication methods with parents about their children's academic success (Natale & Lubniewski, 2018). Given that the rapid development of digital technology affects interactions between home and school, the purpose of this quantitative study was to determine if a relationship exists between the number of times parents initiated communication using an online parent portal and Grade 3–5 students' ELA and mathematics grades. This chapter presents information on the study's research design and rationale, methodology, and threats to validity. The chapter concludes with a summary.

Research Design and Rationale

Research design is the framework investigators use to answer who, what, and how questions; the design guides the researcher at different levels of research (Frankfort-Nachmias & Nachmias, 2008). The research design helps a researcher collect, organize, analyze, and interpret the data (Frankfort-Nachmias & Nachmias, 2008). In nonexperimental research, the researcher does not manipulate the independent variable and cannot control other variables that could influence the outcome of the investigation (Warner, 2013).

In this study, I used a quantitative nonexperimental cross-sectional design. Quantitative methodology is used to examine the relationship between variables (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). A quantitative nonexperimental design is used to measure two or more variables (dependent and independent) that the

researcher suspects have a meaningful relationship (Warner, 2013). In a cross-sectional study, data are collected to answer the research questions. A cross-sectional design is used to examine data from a population at one specific point in time and is one of the most popular and commonly used study designs (Frankfort-Nachmias & Nachmias, 2008). Data from the current study's population were examined at one point in time (the 2019–2020 school year). Archived data were used to reduce time and resource constraints in this quantitative nonexperimental cross-sectional study. Using a quantitative nonexperimental cross-sectional design was consistent with current research in the field of parent–teacher communication using technology-based tools (see Blau & Hameiri, 2017; Can, 2016; Gu, 2017; Palts & Kalmus, 2015; Patten, 2017; Roman & Ottenbreit-Leftwich, 2016; W. Sung, 2016; Y. Sung et al., 2016).

As defined by Frankfort-Nachmias and Nachmias (2008), variables are identifiable and measurable properties or attributes. The current study's variables were the number of times parents initiated quarterly communication using a parent portal (independent) and the students' ELA and mathematics grades (dependent). This study's design included collecting archived Grade 3–5 online parent portal data from eight elementary schools in the Southeast region of the United States.

The dependent variable is the variable for which an investigator wishes to explain the changes, and the independent variable explains the change (Frankfort-Nachmias & Nachmias, 2008). In the case of parent–teacher communication using technology tools, each parent communication using a parent portal represented a characteristic of parent–

teacher communication. The students' ELA and mathematics grades were dependent on the number of times parents communicate using a parent portal.

To determine the study's design, the researcher must determine how to measure the variables when conducting research. Measurement is the act of quantifying through the assignment of symbols or numerals to empirical properties according to a prescribed set of rules (Warner, 2013). Four primary levels of measurement are (a) nominal, (b) ordinal, (c) interval, and (d) ratio (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). The variables selected for this study were measured using an interval/ratio level of measurement.

Methodology

Methodology, according to Frankfort-Nachmias and Nachmias (2008), represents an explicit system of rules and procedures. Methodology provides a blueprint and foundation for conducting research (Frankfort-Nachmias & Nachmias, 2008). A quantitative nonexperimental cross-sectional design was employed in the current study.

Population

Populations are large sets of data that include people, items, or events in a group, which a researcher investigates in a study (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). The research problem determines the population's characteristics under examination (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). The current study's target population was Grade 3–5 students attending eight elementary schools in a fully accredited public school district in the Southeast region of the United States.

The study site's public school district requires teachers to communicate with parents by entering weekly assignment information, grades, and attendance using the PowerSchool web-based software application student information system. Teachers can include additional comments and request face-to-face or telephone conferences with parents. When parents sign in to their online parent portal, they can view their child's weekly assignments, grades, attendance, and comments from the teachers. Parents can also communicate with their child's teacher through comments, email, and requesting a face-to-face or telephone conference.

Sampling and Sampling Procedures

Sampling is the process of selecting the participants for a study (Frankfort-Nachmias & Nachmias, 2008). Frankfort-Nachmias and Nachmias (2008) noted that the value of the standard error determines the sample size of a study on the width of the confidence interval the researcher sets. The wider the confidence interval, the smaller the risk, and a slim interval presents a greater risk of concluding the wrong information (Frankfort-Nachmias & Nachmias, 2008).

Two types of sampling were used for this study: convenience and stratified random. Convenience sampling is the process of selecting samples based on what is conveniently available to the researcher (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). In educational research, using geographical proximity is common and makes it easier for the researcher to obtain the necessary data. Stratified random sampling, which is also referred to as probability sampling, is used to ensure that each group within a population is equally represented (Frankfort-Nachmias & Nachmias,

2008; Warner, 2013). The Southeast U.S. public school district in this study was selected because of the school district's geographical proximity to me. To address the study's sampling limitation and minimize the external threat to the validity of interaction of subject selection, I selected a school district where I am not employed.

To determine the appropriate sample size for this study, I conducted an a priori power analysis using the statistical software G*Power, Version 3.1.9 (see Faul, Erdfelder, Buchner, & Lang, 2009). Assuming a medium effect size ($f^2 = .15$), $\alpha = .05$, and two predictor variables, the results of an a priori power analysis indicated a minimum sample size of 68 participants to achieve a power of .80.

Data Collection

There are multiple methods to collect data. However, according to Warner (2013), regardless of the type of data (e.g., archival, mass media) collected, the researcher should be aware of potential problems associated with the data collection method. The data for the current study were collected from a Southeast U.S. public school district's archived databases. The assistant superintendent of human resources for the selected public school district directed the executive director of testing and accountability and student information systems to provide me with 2019–2020 parent portal archival data for my study. The request for archival data included the number of times parents initiated quarterly communication using the online parent portal and the Grade 3–5 level ELA and mathematics grades. ELA and mathematics were selected because these subject areas are tested annually, and they were my primary focus.

Jones (2010) defined archival data as information aggregated by researchers that are made available for other researchers to use. According to Jones, archival data have many potential advantages, such as resource savings, large samples, and ease of data transfer and storage. However, Jones argued that using archival data also has potential disadvantages (e.g., appropriateness of data, completeness of documentation, and quality of data).

The identities of the parents, teachers, and students in the archived data set were not revealed. To gain access to the archived data for this quantitative study, I submitted a formal written request for archived parent portal data to the Southeast U.S. public school district's assistant superintendent of human resources. The written request to collect archived data from the public school district included the educational purpose of the request and demonstrated compliance with the Walden University Institutional Review Board (IRB). The archived data collected for this quantitative study were received in the form of a digital spreadsheet file. The digital file was stored on my password-protected computer in a locked file cabinet. I will destroy all data related to this study through a process of deleting the files from my password-protected computer after 3 years.

Instrumentation and Operationalization of Constructs

The problem addressed by this study was a need to investigate parents' use of a technology-based parent portal to communicate about the education of children to examine the possible correlation between this form of communication and students' academic achievement. Archival data for this study were collected from a Southeast U.S. public school district's archived databases in the form of a digital spreadsheet file.

PowerSchool was the student information system used to collect and store parent and student Grade 3–5 ELA and mathematics data for this study. PowerSchool used the relational database management system, which was modeled after Codd's (1970) relational model, to collect and store the information supplied by the public school district selected for this study. Data collected using the relational database model are kept in tables (i.e., spreadsheets), also known as relations. The tables consist of columns, categories, rows (i.e., records) containing data defined by categories. The relational model for database management systems was developed by Codd in 1970. The relational database model is the most commonly used model in today's industry.

I received digital spreadsheet data files from a Southeast U.S. public school district that contained the following data from eight elementary schools: grade level; parent login; and first-, second-, and third-quarter students' ELA and mathematics grades. Although PowerSchool was the student information system the Southeast U.S. public school district used to collect, organize, and manage the school district's student information, the teachers were responsible for entering all data related to the students' ELA and mathematics grades. Each teacher logged in to their PowerSchool account to enter weekly numerical grades, which were derived from daily and weekly classroom formal and informal assessments. The student's quarterly ELA and mathematics grades, the dependent variables for the study, were based on assessment data derived from the i-Ready (2020) diagnostic measure instrument. The i-Ready diagnostic measure instrument used computer adaptive testing and the Rasch item response theory model developed by Rasch in 1960 to ensure a valid assessment conclusion. The Rasch item response theory

model is a psychometric model that analyzes categorical data and can prove that a measuring instrument has a high degree of validity and reliability (Rachman & Napitupulu, 2017). In addition, the i-Ready items measured were selected from the Southeast U.S. public school district's state standard course of study.

Once the teacher information is entered into PowerSchool, parents can sign in to the parent portal and view their child's student information. All parents receive a PowerSchool parent portal access code at the beginning of each school year. They can use this information to register and use the parent portal web-based student information system to view their children's assignment information, grades, and attendance. Although the parent portal is available to all parents, registering and using the web-based student information system is optional.

The Southeast U.S. school district's state department of public instruction selected for this study conducts annual information technology audits to evaluate the controls' quality and safeguards over the information technology resources of the state agencies. The state audits involve reviewing the effective use of information technology resources (i.e., PowerSchool), adherence to management's policies, and encouraging the design and implementation of adequate controls over computer applications and the computing environments in which they are used. Furthermore, the Institute of Internal Auditors' code of ethics, which includes the principles of integrity, objectivity, confidentiality, and competency, is applied and upheld by the state board of education and the department of public instruction, which oversee PowerSchool.

Data Analysis Plan

I examined the relationship between the number of times parents initiated quarterly communication using an online parent portal and Grade 3–5 level students' academic achievement. Once the archived data for this quantitative study were collected, they were analyzed using the IBM Statistical Package 25 for the Social Sciences statistical software. This study had two research questions. Each research question had one independent variable and one dependent variable. A simple bivariate linear regression analysis was performed to assess the relationship between the independent and dependent variables. This model fit well with my research questions because, according to Warner (2013), simple bivariate linear regression analysis is appropriate for determining the relationship between independent and dependent variables.

To summarize the relationship between the dependent and independent variables in this study, descriptive statistics data (i.e., gender and grade) were reported. According to Frankfort-Nachmias and Nachmias (2008), researchers use descriptive statistics to organize and summarize data and reduce the data to an understandable form. The alpha level for this study was .05. An alpha level of .05 exemplifies an acceptable risk for most researchers using statistics (Warner, 2013).

Threats to Validity

Internal and external are the two main types of validity (Frankfort-Nachmias & Nachmias, 2008). Internal validity denotes the validity of the measurement and the test. It is only applicable in studies trying to establish a causal relationship, whereas external validity indicates the ability to generalize the findings to the target population (Frankfort-

Nachmias & Nachmias, 2008). Although internal and external threats are the two main types of validity, there are other types of validity, such as face, construct, and concurrent validity.

Face validity is concerned with whether a measurement method appears at face value to measure what it intends to measure and is considered the weakest type of validity (Frankfort-Nachmias & Nachmias, 2008). Construct validity is concerned with the degree to which a test measures the construct it claims to be measuring (Frankfort-Nachmias & Nachmias, 2008). According to Frankfort-Nachmias and Nachmias (2008), it is challenging to establish construct validity when measuring abstract phenomena. Concurrent validity distinguishes between groups (Frankfort-Nachmias & Nachmias, 2008). For example, assessing parent–teacher communication using a technology tool such as a parent portal, a measure should be able to distinguish between parent–teacher communication using traditional methods such as a written weekly newsletter and communication using a parent portal. The results of any discriminating test are more powerful if you can show that you can discriminate between 2 groups that are similar (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013).

To guarantee the successful utilization of the researcher's results, validity is fundamental in a research study. The researcher should control for variables that may threaten the validity of the study as much as possible. The design of the study, data collection, or population size are some factors that may affect the internal validity of a study. The current study used 2019-2020 archival data collected from a Southeast U.S. public school district. Using archived data helps minimize the threats to validity because

the researcher does not have to use existing measurement instruments or create a measurement tool that has to meet additional standards to collect data (Frankfort-Nachmias & Nachmias, 2008; Jones, 2010; Warner, 2013). The lack of external validity may prevent a study's findings from being generalized to a larger group (Frankfort-Nachmias & Nachmias, 2008). This study was concerned with the relationship between the number of times parents initiated quarterly communication using a parent portal and Grade 3–5 students' ELA and mathematics grades.

Ethical Procedures

Researchers must maintain ethical considerations when conducting research. According to Frankfort-Nachmias and Nachmias (2008), anonymity and confidentiality are two conventional methods used to protect participants. To protect the participants, the archived digital spreadsheet file I received from a Southeast U.S. public school district did not include the parents, teachers, or students' identity. The assistant superintendent of human resources, the executive director of testing and accountability and student information systems, and I have access to this study's data. The data was received in the form of a digital spreadsheet file. The digital file was stored on my password-protected computer in a locked file cabinet. All data collected related to this study will be destroyed by me through a process of deleting the files from my password-protected computer after three years. To further ensure the participants' ethical consideration, I participated in the Walden University self-paced online tutorial that provided general information about the IRB and appropriate ethical concerns. I submitted an IRB application to obtain approval to conduct research. The IRB approval number for this study is 03-19-20-0128720.

Summary

This quantitative nonexperimental cross-sectional design study involved examining parents using an online parent portal to explore a possible relationship to students' ELA and mathematics grades. The focus of Chapter 3 was identifying the research design and its connection to the research questions, methodology, and threats to validity. The rationale for using a quantitative method identified the population, sampling and sampling procedures, type of data and data collection, and ethical procedures associated with the study's central theme were provided. Chapter 4 provides a brief review of the study's purpose, research questions, hypotheses, data collection, analysis of the data, and a comprehensive explanation of the data analysis results.

Chapter 4: Results

The purpose of this quantitative study was to determine if there was a relationship between parents' average quarterly use of a parent portal and students' average quarterly ELA and mathematics grades at the Grade 3–5 level. I requested and received first-, second-, and third-quarter parent sign-in data from my partner organization, which provided enough records for my power analysis. In this Chapter, I explain any modifications or unusual circumstances in the data collection, provide a comprehensive explanation of the data analysis results, present information on the study's purpose, and conclude with a summary.

Data Collection

The data collection phase for this study started on February 5, 2020, with a written request to a Southeast U.S. public school district to become my partner organization. Subsequent communications with the school district resulted in an approval of my request on February 20, 2020. Afterward, I completed and submitted all necessary documents to the IRB and received approval on March 19, 2020. I notified my partner organization of the IRB approval. I received an archived electronic data file containing the first quarter parent sign-ins, students' ELA and mathematics grades, and students' gender and ethnicity from eight schools at the Grade 3–5 level. I asked for parent and teacher demographic data, but only parent data were available. Therefore, I made modifications to the data analysis presented in Chapter 3 to accommodate this new information. Finally, with IRB approval, I collected additional data files from my partner organization for the second and third quarters, parent sign-ins, students' ELA and

mathematics grades, and students' gender and ethnicity from eight schools at the Grade 3–5 level. I concluded my data collection process on May 22, 2020.

The population of this study was Grade 3–5 students from eight Southeast U.S. elementary schools. The sample data were collected at the school grading quarter level. Each school had three grading quarters and three grade levels, producing nine cases per school (9 x 8 schools = 72 cases) as the sample for my statistical analysis.

Results

I examined the relationship between the number of times parents initiated quarterly communication using an online parent portal and the average ELA and mathematics quarterly grades of Grade 3–5 students. There were two research questions. Each question had one independent variable and one dependent variable. I conducted a simple bivariate linear regression analysis to assess the relationship between the independent and dependent variables. This model fit well with the research questions because, according to Warner (2013), simple bivariate linear regression analysis is appropriate for determining the relationship between independent and dependent variables. However, to ensure my data could be analyzed using linear regression and to get a valid result, I checked to see whether my data satisfied the six assumptions for linear regression.

Six Assumptions for Linear Regression

Although a simple bivariate linear regression analysis was appropriate for determining the relationship between the two variables (the number of times parents signed-ins and students' grades), before conducting the linear regression I needed to

confirm that my data satisfied the six assumptions for linear regression. Assumption 1 is the linear analysis should have two or more variables that are measured at a continuous level, either interval or ratio. Assumption 2 is a linear relationship exists between the two variables. Assumption 3 is there are no significant outliers, which are single data points that are farthest from the regression line. Assumption 4 is independence of observations, which means each participant in the study counted once. Assumption 5 is homoscedasticity, which means the variances on the line are the same across all values of the independent variables. Assumption 6 is normality, which means the residuals (errors) of the regression line are approximately normally distributed.

After assessing my ELA and mathematics data to determine whether my data could be analyzed using linear regression analysis, I discovered my ELA data satisfied the six assumptions for linear regression and could be analyzed using regression. However, my mathematics data did not satisfy the six assumptions. The mathematics data contained an outlier. Outliers are single data points that are farthest from the regression line (Warner, 2013). There are several ways to address outliers, such as leave the outlier in, drop the outlier, winsorization, or transformation. Winsorizing the outlier was the most appropriate method to proceed with my simple bivariate linear regression analysis. Winsorization is the process of minimizing outliers' influence in the data by giving the outlier a lesser weight or amending the value to reflect a closer value to the other values in the data set (Warner, 2013).

Research Question 1

RQ1: Is there a relationship between the number of times parents initiate quarterly communication using a parent portal and students' English language arts average quarterly grades?

I conducted a simple bivariate linear regression to examine the relationship between the number of times parents initiated quarterly communication using a parent portal and students' average quarterly ELA grades. The results of the simple bivariate regression linear analysis were not significant: $F(1, 70) = 2.065$, $p = .15$, $R^2 = .029$. The findings suggested that the average quarterly ELA grades of Grade 3–5 students were not significantly predicted by the number of times parents initiated quarterly communication using a parent portal. Therefore, I accepted the null hypothesis: The number of times parents initiated quarterly communication using a parent portal does not predict students' average quarterly ELA grades.

Research Question 2

RQ2: Is there a relationship between the number of times parents initiate quarterly communication using a parent portal and students' mathematics average quarterly grades?

I conducted a simple bivariate linear regression to examine the relationship between the number of times parents initiated quarterly communication using a parent portal and students' average quarterly mathematics grades. The results of the simple bivariate linear regression analysis were not significant: $F(1, 70) = 3.858$, $p = .053$, $R^2 = .052$. When $p = .05$, the number is often expanded to ensure that a more exact calculation

is included for the purposes of making a decision about the null hypothesis. The findings suggested that the average quarterly mathematics grades of Grade 3–5 students were not significantly predicted by the number of times parents initiated quarterly communication using a parent portal. Therefore, I accepted the null hypothesis: The number of times parents initiated quarterly communication using a parent portal does not predict students' average quarterly mathematics grades.

Summary

Chapter 4 provided a brief review of the study's purpose, research questions, hypotheses, data collection, analysis of the data, and a comprehensive explanation of the results of a simple bivariate linear regression statistical analysis. This study contained two research questions. I examined my data to determine whether they satisfied the six assumptions for linear regression standard. After determining my ELA data passed the standard, I conducted the first simple bivariate linear regression to examine the relationship between the number of times parents initiated quarterly communication using a parent portal and students' average quarterly ELA grades. The results of the first simple bivariate linear regression analysis were not significant: $F(1, 70) = 2.065$, $p = .15$, $R^2 = .029$. Therefore, I accepted the null hypothesis. The number of times parents initiated quarterly communications using a parent portal was not a significant predictor of ELA average quarterly grades. The mathematics simple bivariate linear regression analysis were not significant: $F(1, 70) = 3.858$, $p = .053$, $R^2 = .052$. Therefore, I accepted the null hypothesis. The number of times parents initiated quarterly communications using a parent portal was not a significant predictor of mathematics average quarterly grades.

Chapter 5 provides a brief review of the study's purpose, the interpretation of the findings, limitations of the study, recommendations, implications, and a conclusion.

Chapter 5: Discussion, Conclusions, and Recommendations

Parent–teacher online communication using technology tools such as parent portals has become increasingly popular because the traditional methods of communication, such as monthly calendars, parent–teacher conferences, visits to the school, and letters, have become ineffective means for educators to communicate with parents about the academic achievement of their children (Natale & Lubniewski, 2018). At the time of this study, research related to using technology tools to enhance parent–teacher communication and increase student academic achievement was limited (Goodall, 2016). To address the gap in existing literature related to parents' use of technology-based tools to communicate and the relationship between use of these tools and students' achievement, further research was needed (Goodall, 2016; Heath et al., 2015; Palts & Kalmus, 2015). In this chapter, I provide a brief review of the purpose of the study, the interpretation of the findings, limitations of the study, recommendations, implications, and a conclusion.

The purpose of the study was to determine if there was a relationship between the number of times that parents initiated quarterly communication using an online parent portal and Grade 3–5 students' ELA and mathematics grades. Two research questions guided the literature review, data collection, and statistical analysis of this data. To ensure the study's sample was large enough to run a meaningful statistical analysis, I collected data at the school quarter grading level. Each school had three grading quarters and three grade levels available, producing nine cases per school (9 x 8 schools = 72 cases) as the sample size for the simple bivariate linear regression analysis.

Key Findings

This study contained two research questions. Two simple bivariate linear regression analyses were conducted to examine the relationship between the number of times parents initiated quarterly communication using a parent portal and students' average quarterly ELA and mathematics grades. The results of the ELA simple bivariate linear regression analysis were not significant. Therefore, I accepted the null hypothesis and rejected the alternative hypothesis. The number of times parents initiated quarterly communications using a parent portal was not a significant predictor of students' ELA average quarterly grades. The results of the mathematics simple bivariate linear regression analysis were also not significant. Therefore, I accepted the null hypothesis and rejected the alternative hypothesis. The number of times parents initiated quarterly communications using a parent portal was not a significant predictor of students' mathematics average quarterly grades.

Interpretation of the Findings

The findings from this study indicated the nonsignificant relationship between parents' use of technology-based parent portals and students' academic achievement. A comparison of this study's findings with what was found in the peer-reviewed literature in Chapter 2 confirmed, disconfirmed, or extended the knowledge in the discipline of educational technology. In Chapter 2, I synthesized literature on two themes, parent–teacher communications and technology and parent–teacher communication challenges, and seven subthemes: communication preferences, mobile technology parent–teacher communication, information communication technology and parent–teacher

communication, school website parent–teacher communication, mobile application parent–teacher communication, parent–teacher–school collaboration, and parent and teacher communication efficacy.

Parent–Teacher Communication and Technology

This study's conclusion that the number of times parents initiated quarterly communication using a parent portal was not a significant predictor of students' average quarterly ELA and mathematics average quarterly grades for students in Grade 3–5 was not consistent with what has been found in the peer-reviewed literature. Goodall's (2016) examination of multiple works addressed technology-based systems such as websites, parent portals, email, FaceTime, and Skype established by schools to engage in communications with families. Although the findings of the current study were not consistent with the previous research, at the time of the current study there was limited research in the field of educational technology (Goodall, 2016). Considering this limitation, Goodall argued that no one technology source could be recommended due to insufficient knowledge regarding technology-based sources of parent–teacher communication.

Parent portal access. Parent portals are apps embedded in school websites intended for parents and teachers to use to enhance home–school communication and students' academic achievement (Alvarez & Ines-Garcia, 2017; Gu, 2017; Roman & Ottenbreit-Leftwich, 2016). At the beginning of the school year, all parents in the current study received a parent portal access code. The parents were encouraged to use their access code to register and access the parent portal web-based student information system

to view their children's assignment information, grades, and attendance. The PowerSchool data collection system used by the Southeast U.S. school district for this study was limited to the number of times parents signed in to the parent portal. PowerSchool did not record whether the parents were viewing ELA or mathematics when they signed in to the parent portal. Regarding extant literature, more extensive research was conducted that included but was not limited to parents' use of parent portals. These studies' results suggested a significant relationship between using digital technologies and students' academic achievement (Chena & Chena, 2015; Palts & Kalmus, 2015).

Role of the teacher. The current study's focus was examining the relationship between the number of times parents initiated quarterly communication using a parent portal and students' ELA and mathematics average quarterly grades. The results did not indicate a significant relationship between the number of times parents initiated quarterly communication using a parent portal and students' ELA and mathematics average quarterly grades. Given these results, it is essential to understand teachers and other school personnel's role related to using technology-tools to engage in digital parent portal conversations with parents about student academic achievement. The number of times teachers initiated communication using a parent portal was intended to be reviewed and analyzed to determine if there was a relationship between teachers' communication and students' ELA and mathematics grading. However, my partner organization did not collect data on the number of times teachers initiated communication using an online parent portal. Therefore, the relationship between teachers' communication using an online parent portal and students' grades could not be examined in this study.

Communication preferences. In the current study, a parent portal was the exclusive parent–teacher communication platform between home and school. Natale and Lubniewski (2018) reported inconsistencies between parents' and teachers' expectations regarding communication method. Most families chose email or other technology methods as their preferred mode of communicating with their child's teacher and believed their child's teacher was accessible through technology (Natale & Lubniewski, 2018). Some parents preferred more traditional communication methods, such as bulletin boards, notes, or meetings. In the current study, traditional communication methods could not be evaluated because I did not address traditional methods of parent–teacher communication.

Mobile technology parent–teacher communication. Some type of technology device is required for parents to access the parent portal. Although the online parent portal was the sole method of parent–teacher communication between home and school for the current study, parents' devices were not examined. W. Sung (2016) argued that a digital divide exists among individuals who have access to digital devices, such as a smartphone, and those who do not. W. Sung and Y. Sung et al. (2016) concluded that smartphone mobile technology influences the way parents and teachers communicate and helps close the gap between individuals of varying incomes, occupations, ages, and levels of education. If parents do not have a digital device and Internet access, they cannot access and sign in to the parent portal. Parents' ability to use mobile device technology to sign in to the parent portal was not addressed in the current study.

Information communication technology and parent–teacher communication. Parent–teacher communication using the ICT parent portal to improve students' academic achievement was examined in the current study. However, the findings did not align with those from as Ferraro (2018). I found that the number of times parents initiated quarterly communication using a parent portal was not a significant predictor of students' average quarterly ELA and mathematics average quarterly grades for students in Grade 3–5. However, Ferraro found that students who used ICT improved their mathematics test scores and were almost 16 times more likely to do better on their mathematics tests than students who did not use ICT. In separate studies, Heath et al. (2015) and Razak et al. (2018) found using current and varied forms of ICT between the home and school opened pathways for communication.

School websites parent–teacher communication. School websites are the host of parent portal apps. School websites are fundamental for parents to gain access and sign in to the parent portal. Previous research showed school websites were crucial communication tools (Alvarez & Ines-Garcia, 2017; Gu, 2017; Taddeo & Barnes, 2016). There is a considerable cost to develop and maintain websites that address the needs of the parents and the community (Taddeo & Barnes, 2016). Regardless of the cost, functional websites that address users' needs are imperative for home–school online communication (Taddeo & Barnes, 2016). However, the way websites impact parents' ability to sign in to the parent portal could not be corroborated or disputed in the current study.

Mobile application parent–teacher communication. Mobile applications are software programs designed to run on mobile devices such as smartphones or digital tablets (Can, 2016). In the current study, no evidence supported parents' use of mobile applications to sign in to their parent portal accounts. However, mobile applications were among the options available to parents. Mobile applications are available for mobile technology devices designed to provide two-way exchanges (Can, 2016; Eutsler, 2018; Krach et al., 2017). These exchanges can be used to engage in quick and easy communications between home and school to support parent involvement and improve students' academic achievement (Ozdamli & Yildiz, 2014; Sabanci et al., 2017; Sad et al., 2016).

Parent–Teacher Communication Challenges

Many challenges exist related to parent–teacher communication using a parent portal, such as time; distance; negative school experiences; cultural differences; and trust between parents, teachers, and school administrators (Ozmen et al., 2016). The lack of technology tools such as Internet access limits communication opportunities between home and school (Hornby & Blackwell, 2018; Ozmen et al., 2016). The factors identified in previous research that challenge parent–teacher communication could also interfere with parents' ability to use a parent portal to communicate about the academic achievement of their children. The current study did not provide evidence to endorse or refute this theory. Goodall (2016) found that using digital communications was a practical approach to diminish barriers associated with parent–teacher conversations and help close the gap between home–school communication.

Parent, teacher, and school collaboration. Teachers' inability to collaborate with parents is a challenge that prevents home and school from communicating and collaborating about academic achievement (Gartmeier et al., 2016). Teachers' behaviors that are grounded in tension and ambivalence and border on a lack of professionalism when communicating with parents only serve to broaden the gap in home–school collaborations (Egger et al., 2015). The findings of the current study, that parent–teacher communication using a parent portal was not a significant predictor of Grade 3–5 students' ELA and mathematics grading, could not be used to corroborate or dispute the findings of Egger et al. (2015) and Gartmeier et al. (2016). The likelihood of closing the gap between home and school communication is not promising because of teachers' inability to overcome habitual behaviors (Egger et al., 2015; Gartmeier et al., 2016).

Parent teacher communication efficacy. Parents are more likely to become involved with their child's school when they know at least one parent who is also involved (Curry & Holter, 2015). In the extant literature, students with disabilities were a focal point related to whether parents became involved in their children's education. Parents felt the school could do a better job of providing services for students with disabilities and feedback on their children's progress (Rodriguez et al., 2014). The data collected for this study identified students with disabilities in the data sets. However, the data were not disaggregated to distinguish whether parents of children with disabilities signed in to the parent portal more often than parents of children without disabilities.

Self-efficacy theory. The relationship between parents' use of online parent portals and students' academic achievement was examined through the theoretical

framework of Bandura's (1977, 1997) social cognitive theory of self-efficacy. Bandura (1977) described self-efficacy as what a person believes they can do with the knowledge and skills they have, in any circumstance. Although the parent portal is an equal opportunity web-based online information system that allows parents to view their children's assignment information, grades, and attendance, using the parent portal is optional. At the start of my study, Bandura's (1977, 1997) social cognitive theory of self-efficacy seemed appropriate. However, the data needed to support Bandura's (1977, 1997) theoretical framework, such as the measure of the self-efficacy of the parents to sign in to the parent portal and their rationale for using the parent portal, were not available to draw any conclusions related to the self-efficacy of parents to use a parent portal.

Limitations of the Study

The current study's focus was limited to parent–teacher online communication using a parent portal to improve student academic achievement. The central limitation of the current study was the availability of the archival data requested for the study (parent-to-student parent sign-in data). To minimize the potential limitation of using archival data in the current study, I used the most current archival data (i.e., the 2019-2020 school year first-, second-, and third-quarter data). To ensure the study's sample was large enough to run a meaningful statistical analysis, sample data were collected at the school grading quarter level. Each school had three grading quarters and three grade levels available, producing nine cases per school (9 x 8 schools = 72 cases), as the sample size to perform a simple bivariate linear regression analysis.

Convenience and stratified sampling were identified in the current study as a potential limitation. Convenience sampling is the process of selecting samples based on what is conveniently available to the researcher and stratified random sampling, which is also referred to as probability sampling, is used to ensure that each group within a population are equally represented (Frankfort-Nachmias & Nachmias, 2008; Warner, 2013). These limitations were addressed since I selected and used the data available from my partner organization. Furthermore, to address the current study's sampling limitation and minimize the external threat to the validity of interaction of subject selection, I selected a school district where I am not employed.

Recommendations

The purpose of the current study was to determine if there was a relationship between the number of times parents initiated quarterly communication using a parent portal and students' ELA and mathematics average quarterly grades at the Grade 3–5 level. The findings of the current study indicated that parents' use of a parent portal were not a significant predictor of students' ELA or mathematics average quarterly grades. However, based on the findings of the literature, using parent portals to communicate about student academic achievement was encouraging. Given this information, it is recommended that school systems encourage parents to use the online parent portal to communicate between home and school. However, according to Hornby and Blackwell (2018), the lack of technology tools such as the Internet restricted communication opportunities between home and school. Despite these limitations, a collaboration between the community and shareholders such as school administrators, school board

members, business leaders, elected officials, neighborhood watch, and the media is recommended to ensure students' households have internet access so that all children can have an equal chance to succeed academically.

PowerSchool is the primary data collection system used in the Southeast U.S. school district selected for the current study. An investigation into the software system's rationale for the inclusion and exclusion of statistical data such as why data is only collected on parent sign-ins by the school. Collecting data that identified the number of times parents signed in to their child's account is warranted. Furthermore, the school system should explore ways to record parent and teacher sign-ins using the parent portal. An exploration of how age, gender, ethnicity, economics, Internet availability, self-efficacy of parents and teachers to use parent portals, and the educational levels of parents are needed to determine how these factors may interface with the findings of the current study and current literature. In addition, more research is recommended to examine the self-efficacy of parents and teachers to use technology tools to engage in online parent–teacher communication and if there is a relationship between parent–teacher communication and ELA and mathematics students' academic achievement at the K–2, middle, and high school levels. The current study serves as a starting point to comprehend how parents' self-efficacy to use an online parent portal to communicate can influence students' ELA and mathematics average quarterly grades.

Implications

The improvement of human and social conditions, according to Walden University (2020), are the results of positive social change. In the current study,

improving human and social conditions was examined through the lens of parent–teacher communication using a parent portal to improve students' academic achievement and the theoretical framework of Bandura's (1977, 1997) social cognitive theory of self-efficacy. The parents' use of the portal did not predict the students' ELA or mathematics average quarterly grades when parents used a parent portal. The findings of this study presented information that was fundamental to the development and attainment of positive social change about parent–teacher communication using a technology-based online parent portal, the relationship parent–teacher communication using a parent portal had on improving student academic achievement, and the self-efficacy of parents and teachers to use technology.

The literature reflects qualitative, quantitative, and mixed methods research studies that examined using technology-based parent–teacher communications and self-efficacy of parents and teachers to use technology (Alanko, 2018; Baker et al., 2016; Egger et al., 2015; Natale & Lubniewski, 2018; Ndongfack, 2015; Palts & Kalmus, 2015; Ratliffe & Ponte, 2018;). The lack of adequate pre-teacher preparation to collaborate between home and school can create barriers, such as low self-efficacy, to a successful parent–teacher relationship. According to Alanko (2018), many teachers and school administrators had low self-efficacy as it related to using technology. Egger et al. (2015) asserted that teachers' habitual behaviors could influence the collaboration efforts between home and school and student academic achievement.

The implications of the current study serve as a starting point to comprehend how the self-efficacy of parents to use an online parent portal to communicate can influence

students' ELA and mathematics average quarterly grades and positive social change. However, due to the limitations of this research, more exploration in the field of technology-based parent–teacher communication is needed (Goodall, 2016). A decrease in parent–teacher communication and parents' motivation to become involved with their children's day-to-day educational activities, such as assignments, homework, and attendance, are possible consequences if no research is done to support and increase the effectiveness of technology-based parent–teacher communication (Goodall, 2016; Y. Sung et al., 2016).

Conclusion

Parent–teacher communication between home and school is the foundation for student achievement, regardless of the method used (Baeck, 2015; Goodall, 2016; Natale & Lubniewski, 2018; Patrikakou, 2016). However, the development and modernization of ICT, such as parent portals, mobile technology, mobile apps, and websites, give parents excellent availability and opportunities to engage in meaningful conversations with teachers about the academic achievement of their children (Blau & Hameiri, 2017; Gu, 2017; Heath et al., 2015; W. Sung, 2016; Y. Sung et al., 2016). Furthermore, technology-based platforms such as parent portals are becoming parents' preferred method of communicating with their child's teacher and school regarding their children's academic achievement (Natale & Lubniewski, 2018; Palts & Kalmus, 2015; Thompson et al., 2015).

The purpose of the current study was to determine if a relationship exists between the number of times parents initiated quarterly communication using a parent portal and

students in Grade 3–5 ELA and mathematics average quarterly grades. The findings of the current study showed the number of times parents initiated quarterly communication using a parent portal was not a significant predictor of students' average quarterly ELA and mathematics average quarterly grades for students in Grade 3–5. However, the findings among the extant literature suggest a relationship exists between parent-teacher communication and student academic achievement using technology tools such as parent portals. According to the findings of Goodall's (2016) investigation, many technologies were available. However, no one technology-based platform of parent–teacher communication could be recommended due to insufficient knowledge regarding technology-based platforms, thus, reinforcing the need for more research.

If schools, teachers, and parents expect children to experience academic success, the utilization of parent–teacher online communication to engage in meaningful conversations between school and home is necessary (Goodall, 2016). Schools should move beyond old traditional methods of communications such as monthly calendars, parent–teacher conferences, visits to the school, and letters (Natale & Lubniewski, 2018) and embrace new technology-tools such as parent portals for the benefit of student's academic achievement. The goal is for schools to use existing technology-tools and embrace new technologies to increase parent–teacher communication so that students can receive the best possible chance of achieving academic success.

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