

AN ABSTRACT OF THE DISSERTATION OF

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presented on May 26, 2009.

Title: Modernizing School Communication Systems: Using Text Messaging to
Improve Student Academic Performance

Abstract approved:

Jay Casbon

The emerging use of portable digital devices by students, parents and teachers, is forcing schools to develop real-time communication systems that integrate technology into the general operations of schools, and contemplate governing policies and procedures to sustain and guide the challenges of these new technologies. This study contributes to this important issue by providing evidence on the impact of mobile messaging - text messaging (SMS), on US high school student assignment completion rates.

This study designs a field experiment to test for differences in student assignment completion rates, where SMS is used to communicate directly with students and parents about class assignments. Differences in assignment completion rates are compared and tested in three scenarios 1) when students receive text messages on their cell phone regarding class assignments 2) when parents receive text messages on their cell phone regarding class assignments and 3) when both parents and students receive simultaneous text messages on their cell phones regarding class assignments.

Study participants included four teachers, 79 students, and 79 parents within two high schools selected as research sites. The quantitative portion of the study utilized an experimental 4x4 Latin square design to measure the impact of four types of text messaging interventions. Results indicate that SMS to both students and parents resulted in the highest assignment completion rate of 5.16/6, followed by text to parents only 4.75/6, text to students only 4.63/6, and finally, text to students and parents (non-specific assignment) 4.0/6. Empirical results of the Analysis of Variance (ANOVA) tests show that there were 1) significant differences in assignment completion rate by text message intervention type, 2) no statistically significant effects of time period of the intervention transmission, and 3) statistically significant teacher effects.

Overall, these results indicate: that specific assignment information communicated by SMS from teachers to students and parents has a positive impact on student assignment completion, and that comprehensive communication has a strong impact on student achievement. These findings further suggest the need for a broader discussion on how to best form and implement effective policy regarding technology usage within schools.

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Modernizing School Communication Systems: Using Text Messaging to Improve
Student Academic Performance

by
Matthew Scott Crisp

A DISSERTATION

Submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Presented May 26, 2009
Commencement June 2010

Doctor of Philosophy dissertation of Matthew Scott Crisp presented on
May 26, 2009.

APPROVED:

Major Professor, representing Education

Dean of the College of Education

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Matthew Scott Crisp, Author

ACKNOWLEDGEMENTS

I would like to thank my committee members for taking the time to work with me in order to complete this dissertation. I would like to express strong appreciation to my committee major professor, Dr. Jay Casbon, who not only encouraged me to complete doctoral level advanced studies in education, but has been a mentor and friend of mine since I was six years of age. I would like to express deep thanks to Dr. Linda Samek, who provided ongoing assistance, editing, and communication. Her commitment to education and the improvement of schools in Oregon is reflected in her constant professionalism.

I would also like to thank staff members of the Oregon State University library for their assistance in my research. Always proactive, the staff at the library promptly assisted me in identifying relevant research materials. I would like to express a very special thank you to Cohort 05, my fellow doctoral classmates at Oregon State University. The dialogue and debate with all of you should be the model reflected in leadership in public schools. I would like to thank Dennis Dempsey of the High Desert Educational Service District and the 3E Institute of Educational Excellence at West Chester University of Pennsylvania for providing financial support for this dissertation.

And finally, I would like to thank my family for their patience as I made this study the priority in my life. Paula, my wife of 10 years, and Zoe, my 5 year old daughter, it is time to reconnect and play again.

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“Rather than dealing with each technology in isolation, we would do better to take an ecological approach, thinking about the interrelationship among all of these different communication technologies, the cultural communities that grow up around them, and the activities they support.”

--Confronting the Challenges of Participatory Culture: Media Education for the 21st Century (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2006)

CHAPTER I: INTRODUCTION AND RATIONALE

Communication methods that utilize portable digital technologies are changing the landscape of interactions between the sender and receiver. The exchange of information is increasingly available regardless of the time of day or physical location of the recipient or sender. Mobile communication is changing human interaction levels and organizational structures in business or educational institutions. This change reflects the emerging role of mobile communication as a part of everyday life for individuals. Communication can no longer be defined as an exchange of information between humans but now must encapsulate the automated exchange of information from digital sources without the need for human composition. Traditional models of communication reflect characteristics such as speaking, listening, reflecting on feelings, or interpretation of a message (Berger, 2004). A redefining of communication seems to be among us as portable digital devices begin to play a significant role in our interactions, individually, in groups, in our professions, and business organizations.

Reasonable and transparent measured impacts of mobile messaging can be ascertained if examined within a specific type of environment. For the purpose of this study, I will examine the impacts of text messaging (type of mobile

messaging) on high school student academic achievement (specific environment). Text messaging, known as SMS (short message service) provides the opportunity to send and receive 160 characters of text (non-verbal) instantly using a mobile phone (Soriano, Raikundalalia, & Szajman, 2005). Text messages can also be sent from a stationary computer to a recreant's mobile phone using an email application. The portability, ease of use, and instant communication nature of text messaging provide consistent incentive to be a major form of modern portable communication.

Research Problem

Schools are faced with an ever-changing digital society reflected in current uses of portable digital devices by students. It is becoming increasingly clear that school systems must adopt mobile technology policies that reflect an understanding of the dependence individuals have on using mobile technology (Katz, 2006b; Selwyn, 2003). Schools need to develop new models of communication that closely reflect the current uses of mobile technologies. Ownership of mobile phones, regardless of ethnicity, age, and socioeconomic standing has become a reality (Rainie & Keeter, 2006). Schools need to have discussions about using technology already in the hands of students and parents in order to facilitate new communication strategies linking teachers to parents and students in order to improve the educational process. More specifically, a school's

ability to seamlessly link teachers, parents, and students should have significant impact on student achievement (Henderson & Mapp, 2002).

Purpose Statement and Research Questions

As a high school social studies teacher for ten years and currently as a high school principal, I observe the continued evolution of uses of portable digital devices both in the classroom setting and in the general common areas of school campus. Drawing upon personal observation, experience as a classroom teacher, and a passion to further understand the role technology plays in our lives, I will attempt to provide evidence of the impact text messaging has on the educational process of students and parents. This study will seek to understand the impact of consistent teacher contact with parents and students by using text messaging communication systems. The study will ascertain the extent of the relationship between text messaging communication and student academic achievement at the high school level. Text message notifications about homework, tests, and miscellaneous class work will be sent to parents and students. The following research questions will be addressed in this study:

1. Is there a significant difference in student assignment completion rate if students receive text messages on their cell phones regarding class assignments? This research question calls for text messages to be sent to students about classroom related assignments. The assumption made by this research question is that there will be a positive significant impact on student assignment completion rate if teachers communicate with students

using a method socially accepted by teenagers. This research question targets one audience: the student. The high rate of text messaging usage and mobile phone ownership levels by teenagers (Amanda, Madden, & Hitlin, 2005; Networks, 2007; Rainie & Keeter, 2006), regardless of ethnicity or socioeconomics, provides a unique opportunity to evaluate the potentials of mobile communication. By utilizing personally owned mobile phone devices to receive important school related notifications, I will be attempting to bridge the personal with the educational use of technology. Indirect impacts of the study have the potential to surface, such as an examination of the relationship between the informed student and academic achievement.

2. Is there a significant difference in student assignment completion rate if parents receive text messages on their cell phones regarding class assignments? This research question specifically applies to parents receiving text messages on their mobile phones regarding classroom related assignments. Barriers affecting teacher to parent communication have been researched extensively. Such barriers include lack of teacher time, parent working hours, parental avoidance, antiquated school communication systems, language and cultural roadblocks, and authoritative roles (parent and teacher) being misused for self-seeking outcomes (Berger, 2004; McCarthy, 2000; A. Y. Ramirez, 2001; Strom & Strom, 2002; Watkins, 1997). Using mobile communication technology, the traditional barriers that block teacher-to-parent communication will be challenged. It is assumed that the parent represents the authority role in the

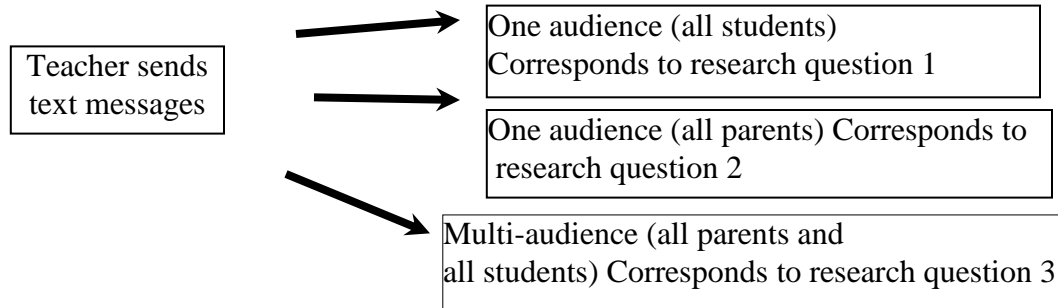
home, therefore parents receiving a text message will be better able to communicate expectations to their children. This research question will uncover the role of the authoritative figure in the home and possibly raise questions about the impact of the informed authoritative figure on the student's academic achievement. Does an informed parent translate into improved student academic achievement? Will parents be more proactive in conversations with their children if they are aware of school related assignments?

3. Is there a significant difference in student assignment completion rate if both parents and students receive simultaneous text messages on their cell phones regarding class assignments? Perhaps the most powerful form of school to home communication is when all members of the communication exchange, teachers, parents, and students, are involved (Henderson & Mapp, 2002). Comprehensive communication removes the need for assurance, the act of checking to make sure a message was received by one member or another. All members are receiving consistent simultaneous information regarding classroom assignments. All members, regardless of role in the educational process, are involved in the information exchange. It seems reasonable to expect that a comprehensive communication system will have a positive impact on student achievement (Henderson & Mapp, 2002). Findings of this study may provide an opportunity to examine child to parent communication in the home about school related assignments. If both parent and student are receiving the

same text message, will there be improvement in family dialogue regarding school assignments?

Figure 1.0

Summary of Research Questions 1-3



Definitions

1. Mobile Phone – A portable digital electronic communication device. Mobile phones allow for wireless communication regardless of location as long as a cellular signal is available. Mobile phones generally allow for voice, text, video and picture communication.
2. Mobile Communication (m-communication) – Mobile communication is a broad descriptor reflecting a variety of methods to exchange information in a portable fashion. In addition to standard mobile phone calls and the use of text messaging, Multimedia Messaging Service (MMS) allows for the sending and receiving of digital video, audio, and photographs. Advanced multifunction mobile digital devices such as the Blackberry and Sidekick allow for the individual to send and receive e-mail regardless of location.

3. Mobile Messaging – Digital messages delivered to an individual regardless of location. Mobile messaging may take the digital media form of audio, text, pictures, or video or may be a combination of different types of digital media forms.
4. Short Message Service (SMS) – Short message service is commonly referred to as text messaging. Text messaging generally allows for the transfer of digital textual information of no more than 160 characters to be delivered to an individual's mobile phone.
5. Assignment Completion – This is the act of a student completing an assignment as directed by the classroom teacher. For the purposes of this study, assignment completion will be measured in relationship to the teacher sending text messages to three different audiences. The assumption is that text message communication by the teacher will have an impact on student assignment completion rate. It is also an assumption of this study that there is a positive relationship between students turning in assignments and academic achievement.
6. Parent – For the purposes of this study, the parent participant is considered the legal guardian of the student participant. The parent who agrees to participate in this study is determined by the household and may be male or female.

Conceptual Framework

Epistemology

Strong classroom teachers are able to fuse the self, core values, personal philosophies, and life experiences into everyday teaching practices. As a practicing educator, I see no other way to understand my conceptual framework than to examine the teaching methods I utilize on a daily basis with my students. This will allow me to compare my conceptual lens with my teaching methods.

Described by Denzin (2003), perspectivism refers to the idea that “all knowledge claims and their evaluation take place within a conceptual framework through which the world is described and explained” (p. 306). My belief system places value on understanding the historical and social history of an individual thus forming a lens in which the individual perceives the world. My epistemology reflects a post-modern approach accepting the general notion that the universe is dynamic and evolving and that truth is relative to experience. Social experience and interaction with others is at the root of learning. The learning theory of constructivism acknowledges that the learner constructs his or her own understanding of truth by interacting with the environment and through the process of self-reflection.

Conceptual Framework Discovered Through The Teaching Profession

An investigation of my teaching methods as a high school and higher education teacher sheds further insight into my self-identity thus allowing for a fully actualized understanding of my conceptual framework. In “Courage to Teach” (1998), Parker Palmer examines issues of teacher identity by exploring the

inner landscape of the teacher. M.T. Thomas' (2002) review of Palmer's work reflects the notion of examining the self through the act of teaching in the following statement:

The selfhood which is the source of good teaching consists of intellectual, emotional, and spiritual dimensions. By spiritual, the author (Palmer) means the heart's longing to be connected with the largeness of life....the exploration of the inner landscape of the teacher's self begins with the premise that good teaching comes from the identity and integrity of the teacher. Identity lies at the intersection of diverse forces that make up life, and integrity lies relating those forces in ways that bring wholeness and life rather than fragmentation and death. (Thomas, 2002, p. 105)

I believe students should receive an integrated education rooted in a holistic approach that empowers them to make informed decisions about significant issues confronting their immediate community, society, and the world. I believe the holistic learning approach is rooted in the realization that the educational process is forever evolving and changing, a continual process for students and teacher who are all part of a life-long journey that extends beyond the immediate learning objectives in the classroom. The holistic approach to learning gives permission to consider the autobiographical approach to teaching emphasizing personal stories. This provides opportunity to identify with others through narrative, dialogue, or common themes while relating to larger issues impacting society.

Embracing a holistic perspective parallels research embodying a sociological or ethnographic perspective. According to Spindler (1982), "The

ethnographic world view assumes that any classroom, any school, any group or community is a variant adaptation within a regional, national, or world variation in culture and social organization” (p.450). Ethnography is a holistic research method that if used in a school setting would first seek to identify a system’s properties such as the student, school, and teacher. Properties cannot necessarily be accurately understood independently of each other. As previously mentioned, the study of education using ethnographic methods allows for an educator to study the entirety of the human condition, in a cultural context, and within social relations (Spindler, 1982). The holistic approach is multifaceted, accepting various sources as relevant information to support conclusions. Thus, the holistic approach provides an arena of multiple perspectives to flourish allowing for the emergence of a study without a pre-defined rigid endpoint, and creates equity in regards to variables which can plague simple, objective research conclusions.

As a researcher, my goal is to transform information acquired into an understandable format for a wider audience, beyond academia, to ponder and question. The investigative process of research I will implement will be organized in a spiral manner so the researcher continually builds upon previous knowledge already learned. The spiral reflects a holistic approach to the educational process, restricting and widening, allowing for a comprehensive analysis of various social, economic, or political issues, and encouraging the identification of patterns in findings. This will provide me the time to reflect and project solutions while asking key questions about the underpinnings of society (Cohen, 1999). From a researcher’s lens, the holistic perspective encompasses a multidisciplinary

approach, while allowing for the recognition of self-biases without a predetermined endpoint.

Research Study Relationship to Conceptual Lens

Not only does there need to be an active fusion between the understanding of self identity and personal teaching practices, I believe there needs to be an active fusion between self-identity and research areas of interest (Palmer, 1998; Thomas, 2002). Understanding my identity and how I come to view the underpinnings of society will provide a framework to identify research areas of interest aligned with my personal passions. The prejudices that I bring to my research will assist in my own self-identification process, helping to further recognize my own prejudices while acknowledging the merits associated with my belief system (Denzin & Lincoln, 2003). At this stage in my doctoral studies, I can only infer that this will lead to genuine, complete, and authenticated research results.

Although my conceptual lens reflects the processes required of qualitative research, I intend on using quantitative research methods to complete this study. Quantitative research data is required in order to justify further investigations regarding the emerging role mobile technology is playing on society. By focusing my research on the quantitative impacts mobile communication technologies have on the educational process, an opportunity will emerge to deeply examine the relationship between mobile technologies and the daily lives of individuals, using sociological or ethnographic methods.

Significance of the Study

This research study into effects of teachers using a text messaging to communicate with parents and students could have significance for the academic community in the following areas: (a) investigation of how schools might use modern forms of mobile technologies to communicate with parents and students, (b) inquiry into schools reexamining technology usage governing policies, (c) use of personally owned technology for educational purposes, (d) new communication systems and an examination of the impacts of mobile technology, (e) existing deficiencies in mobile technology research and the uses of text messaging as a communication tool to benefit educational institutions, and (f) personal experiences and observations as a high school social studies teacher.

Schools Using Modern Forms of Mobile Technology to Communicate With Parents and Students.

Research clearly demonstrates that consistent communication between teachers and parents has positive impacts on academic achievement. This study raises the primary concern of using modern forms of mobile messaging technology to link school and home in a consistent and time efficient manner (Henderson & Mapp, 2002; McCarthy, 2000; A. Y. Ramirez, 2001; Strom & Strom, 2002). Although evaluating the relationship between mobile messaging and student academic achievement is the direct target of measurement in this study, additional indirect impacts will possibly emerge as a result of instant communication from teachers to parents. The call for innovative communication methods that instantly link teachers with parents allows for timely parent

intervention in regards to student class assignments and student misbehaviors (Strom & Strom, 2002).

There is lack of research regarding the uses of mobile technology to enhance school to home communication. This type of communication allows for information to be delivered to students or parents regardless of location, time of day, racial, or socio-economic background. This study will seek to unfold the effectiveness of text messaging to instantly communicate with parents or students and will further provide an opportunity to examine the impacts of communication that is not delayed by message storage mechanisms like static voice or email messages (Strom & Strom, 2002). Communication becomes ineffective once it becomes static, outdated, and not delivered in a time sensitive manner. Research results from this study will shed further light on how mobile technologies may redefine the patterns of interaction in terms of contact consistency and the amount of communication between teachers, parents, and students.

School Systems Reexamining Technology Usage Governing Policies

By examining the relationship between the use of mobile communication in the form of text messaging and student achievement rates, this study will provide the context to further investigate how portable technologies could redefine school technology policies. Existing models of parental involvement created by school systems need to be redefined so that a correlation exists between emerging mobile technologies and a consistent connection between school staff, parents, and students (Katz, 2006b).

By investigating the role of text messaging for educational purposes, this study is part of an overarching theoretical paradox school systems face when

discussions surface regarding the use of mobile technologies. School systems are entering an era that calls for consistent governing policies that monitor student use of digital information in order to protect the general welfare and safety of students and school staff. Schools are also faced with opportunities to embrace such new methods of communication that have the ability to connect people and instantly share information. Do school systems embrace the use of digital mobile communication as means to deploy information to students and parents or extend learning opportunities beyond the classroom? Is school restriction of mobile communication warranted in an effort to preserve academic honesty, student classroom focus, or to maintain school control of information exchange on campus?

This study will provide an opportunity to discuss existing school policies regarding the uses of mobile technology and perhaps how a reexamination of policy could foster the creation of better communication methods. Perhaps the school shootings at Columbine High School in Colorado on April 20, 1999 and Virginia Polytechnic Institute and State University on April 16, 2007 (Press, 2007) will lead to the development of communication systems that deliver information to the individual, regardless of location, versus a new model of communication where the individual seeks information.

The Use of Personally Owned Technology for Educational Purposes

The realities of youth moving to a more technological mobile culture are supported by existing research. Text messaging has emerged as one type of preferred mode of communication for teenagers (Amanda, Madden, & Hitlin, 2005; Rainie & Keeter, 2006). This study acknowledges that text messaging and

the use of portable digital devices have become an extension of the teenage self. This research will serve to examine the impacts of the self becoming intertwined with digital technology in order to evaluate the potential educational benefits. Digital mobile communication devices becoming an essential extension of the self further justifies a closer look into how these devices can be used for educational purposes. By using text messaging communication as the basis of this study, evidence will emerge leading to conclusions about the merit of bridging the personal uses of technology with educational uses. In order for a school system to have a serious discussion regarding major structural changes of policies, it is appropriate to begin to examine the parent and student ownership and usage levels of digital devices. School systems may have the opportunity to begin to shift from purchasing equipment to using digital devices already owned by the target audience. This study will raise the question of whether or not utilizing personally owned digital devices will have a significant impact on student achievement.

Researchers Call for New Communication Systems and an Examination of the Impacts of Mobile Technology

The use of text messaging communication tools to contact students and parents is supported by the existing research, although due to the emerging nature of mobile technology, the current body of knowledge is limited. Arguments by Strom & Strom (2002) state that family dialogue declines about school issues between grades 6 and 12. The lack of communication is a result of “decrease in parent-child time spent together reducing conversations about issues related to life at school, questions on what is being learned in courses, efforts to link lessons from the classroom with applications to everyday life, and help in completing

homework” (Strom & Strom, 2002, p. 15). School related activities at home have a significant impact on academic achievement. If the student and parent receive consistent information about class assignments, discussion of school related assignments will occur leading to a higher assignment completion rate (Sui-Chu & Willms, 1996).

Researchers such as Katz (2006), Strom and Strom (2002), and F. Ramirez (2001) support the development and implementation of new communication systems in schools that reflect current technologies. These communication systems need to allow for consistent opportunities for school staff, parents, and students to interact while acknowledging the time constraints faced by teachers and school administration. A. Y. Ramirez (2001) calls on teachers at the high school level to create and investigate strategies to bridge the communication gap between school and home. New strategies should be implemented carefully as to not create extra work or additional burden on classroom teachers.

Investigating text messaging communication in non-school systems further justifies additional studies regarding utilizing mobile forms of communication to reach a predefined audience. Research by Leong et al. (2006) investigated the use of text messaging in a health care environment. Conclusions of the research reflected clear evidence of the benefits medical patients received by providing them with text message reminders regarding critical care or emergency services.

Existing Deficiencies in Mobile Technology Research and the Uses of Text Messaging as a Communication Tool to Benefit Educational Institutions

There is a lack of research concerning mobile technologies; specifically the impact digital mobile devices are having on our society. James E. Katz (2006b) gives context to the lack of available mobile technology research:

In contrast to computer and internet technology, social science research on mobile communication technology has not caught on quickly among the scholarly community... Happily, though, the situation is improving rapidly, not the least because of a growing international community of scholars dedicated to investigating social aspects of mobile communication technology. (p. 62)

Although there is clearly a lack of research about mobile technology's impact on daily lives of individuals, Katz provides a summary of practicing researchers who are investigating the impacts of mobile communication on daily life. Absent from this list is a targeted research attempt to examine impacts of mobile communication on the educational process (see Figure 1.1).

Figure 1.1

Major Researchers of Cellular/Mobile Technology

| <i>Researcher</i> | <i>Contribution</i> |
|----------------------|--|
| Hans Geser | Examination of the sociology of the mobile phone |
| Dr. Kristof Nyiri | Conference participation that has helped create a community to connect scholars |
| Lara Srivastava | International status of mobile technology |
| Joachim Hoflich | Demonstrated impact of urban space on mobile users |
| Leopoldina Fortunati | Researched fashion aspects of the mobile phone |
| Richard Ling | Published many studies looking into how the mobile phone affects life in various domains |
| Leslie Haddon | Examined mobile phone integration into the household |

(Katz, 2006b)

This study will provide a specific and focused look into the impacts of text message communication on student academic achievement, thus providing data that will encourage follow up studies relating to the field of education.

Personal Experiences and Observations as a High School Social Studies Teacher

My passion is investigating how people learn—in and out of school settings. Investigating the societal forces that impact an individual's capacity to learn requires a holistic approach to knowing. Emerging mobile technologies are beginning to redefine accessibility issues in regards to getting instant information as well as creating structures for new social communication patterns for all ages (Hamill & Amparo, 2005; Ling, 2004). As a social studies teacher at a comprehensive high school (grades 9-12) with approximately 1250 students, I regularly conducted class discussions about the uses of technology. In one discussion, 94 out of 113 students stated that they text message to communicate with friends or parents at least three times a day. It has become increasingly clear that teenagers and young adults use text messaging as a dominant form of communication (Amanda, Madden, & Hitlin, 2005; Rainie & Keeter, 2006).

Beyond reviewing the uses of mobile technologies as educational communication tools, it is becoming clear that student learning is forever changing due to digital technologies and instant access to information. The architecture of learning is shifting as a result of instant information retrieval and communication. Societal patterns, business organizations, and educational institutions need to embrace these shifts to stay competitive in a changing society.

CHAPTER II: REVIEW OF THE LITERATURE

The purpose of the literature review is to present a two-fold evaluation of research concerning school to home communication followed by a more specific review of research concerning the emerging role of mobile messaging communication. Examining the impacts of school to home communication requires an investigation of research pertaining to the roles teachers, parents, and students play in the school communication process. Extensive research currently exists outlining the importance of school to home communication and the direct relationship it has to student academic achievement (Henderson & Mapp, 2002). Yet there is an absence in the research literature regarding school systems implementing emerging digital mobile technologies to increase communications with parents and students.

Organization of Review of Literature

This literature review is divided into two parts. Part one examines research about school to home communication and the roles teachers, parents, and students play in order to have a collaborative communication system. Specific areas of focus for part one include: (a) the impacts of parent, teacher, and student communication on academic achievement, (b) obstacles to school to home communication, and (c) a review of traditional and emerging school communication strategies. Part two moves this review of literature from a general discussion regarding school to home communication to a targeted review of

emerging mobile messaging communication, specifically SMS (Short Message Service) commonly referred to as text messaging. Specific areas of focus for part two include: (a) a general description of text messaging, (b) an evaluation of international usage of text messaging, (c) usage of text messaging by gender, age, and ethnicity, and (d) the beginnings of mobile communication research in educational environments.

Part One

Teacher, Parent, Student Communication: Clear Benefits

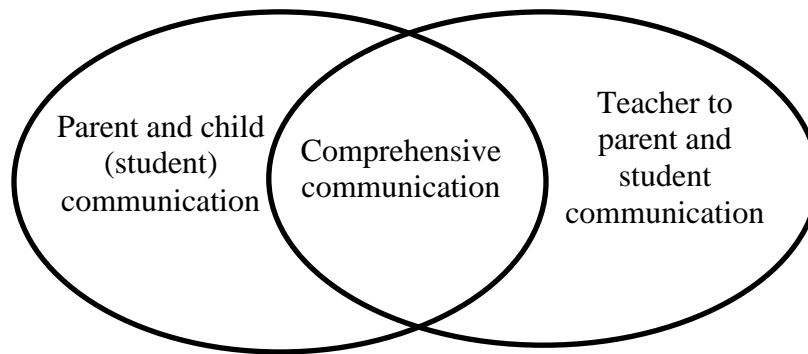
According to a MetLife Survey (2002) the American Teacher, 71% of principals and 59% of teachers called parent involvement a priority but were also frustrated with the level of involvement. According to the National School Public Relations Association (NSPRA), it is clear that there is a direct correlation between parent involvement and higher academic achievement, improved attendance, and positive behaviors by students in school (Padgett, 2006; A. Y. Ramirez, 2001; Strom & Strom, 2002; Watkins, 1997). The NSPRA provides several suggestions to increase parental involvement such as creating a district wide plan establishing concrete goals that reach out to parents and to further identify barriers such as language, transportation, literacy, or scheduling that might be compromising parent involvement (Padgett, 2006).

Consistent and clear communication between teachers and parents has residual effects beyond increased academic performance. Musti-Rao and Cartledge (2004) point out that a collaborative relationship between the teacher

and parent leads to improved parental self-image resulting in a more positive working relationship between the teacher and parent. Better communication between the parent and teacher confirms commitment to the educational process thus resulting in children realizing that people care about their education. F. Ramirez (2001) notes, “Students tend to place greater importance on their education when they see their parents actively involved in it. Also, students have suggested that they want to see their parents involved in their education at the school level” (p. 30). It is clear that communicating with parents about classroom expectations and assignments results in a positive working relationship, and in most cases, positive personal and academic results for the child (Musti-Rao & Cartledge, 2004).

The evidence is clear in regards to the relationship between student achievement and consistent school communication with students and parents. There is ample evidence demonstrating that consistent and constructive communication influences student achievement at all ages. Henderson and Mapp (2002) summarize two important avenues of communication exchange: family members communicating with their children about the educational process and consistent teacher communication with parents and students (Figure 2.0).

Figure 2.0

Communication Avenues

Comprehensive communication requires a commitment by parents, students, and school staff. Further research needs to be conducted about communication of school related topics between the parent and child and the effect on academic achievement. In order for comprehensive communication to become a reality, school systems need to examine and measure outcomes of existing communication systems and identify their impact on the ability to create positive relationships between teachers, students, and parents.

Henderson and Mapp (2002) provide a summative statement reflecting the necessity of this relationship:

When parents talk to their children about school, expect them to do well, help them plan for college, and make sure that out-of-school activities are constructive, their children do better in school. When schools engage families in ways that are linked to improving learning, students make greater gains. When schools build partnerships with families that respond to their concerns and honor their contributions, they are successful in

sustaining connections that are aimed at improving student achievement.
(2002, p. 8)

Although Henderson and Mapp's primary focus is placed on examining the connections between school and home, they also acknowledge additional factors that must complement communication in order to improve student achievement. These factors include schools implementing high standards and student expectations, instruction aligned with assessment and standards, effective leadership, and focused professional development. All of these factors are considered the building blocks of most school systems (Henderson & Mapp, 2002).

Obstacles To Teacher, Parent, Student Communication

It would seem the communication process between schools, parents, and students would be an easy process because of the shared common goal of student success in school. Consequently, it has become apparent that a common goal shared by schools, parents, and students does not translate into shared methods of communication or outcomes.

A plethora of research evidence exists that outlines communication breakdown between teachers and parents. In "Reflecting on the Homework Ritual: Assignments and Design," Van Voorhis (2004) examines the general homework practice by students including time spent on homework and communication between the teacher and home. She reports in a study conducted in 1,011 middle schools that principals believe "fewer than half of their students' parents received regular information from teachers about how to help their children with homework" (p. 207). Parents also reported that they often feel

unprepared to assist their children in homework and would also like more information on teachers' expectations of homework quality. Van Voorhis calls for more teacher professional development to learn about student time allocated to homework and to form creative communication outlets between school and home about homework expectations and policies.

According to Berger (2004), roadblocks that hinder communication between schools, parents, and students general fall into two different camps; parent roadblocks and school roadblocks (Figure 2.1).

Figure 2.1

Roadblocks to Communication

| <i>Parental Roadblocks (Roles)</i> | <i>School Roadblocks (Roles)</i> |
|---|---|
| <p>Protector. Create a shield of defense</p> <p>Discomfort. Uncomfortable talking about school issues.</p> <p>Avoidance. Avoid school participation due to personal history.</p> <p>Indifferent. Shifting parental responsibilities to others due to time or financial constants.</p> | <p>Authority. School staff reflecting a chief executive persona.</p> <p>Provide sympathy. Consoling parents of the inadequacy of their child</p> <p>Protect the school. Inability of school staff to advocate for parents.</p> <p>Lack of time. School staff to busy to establish continuous contact.</p> |

(Berger, 2004)

Parents are increasingly refusing to return voice phone messages and some ignore requests by teachers or school administrators to attend conferences. Studies suggest that a lack of communication between school and home coincides with a rise in student misbehavior. Improved communication between teachers and parents may eliminate the tendency to blame one another for student misbehavior or lack of academic success. The implications of student misbehavior have wider

consequences related to school safety, which is a significant concern for most parents (Strom & Strom, 2002).

The obstacles of teacher to parent communication are reflected in antiquated communication systems riddled with information transfer inconsistencies. The breakdown of communication may take on many forms which include: parents unable to talk to a teacher during work hours and students intercepting school documents, telephone voice messages, or emails (Strom & Strom, 2002). It seems clear that a lack of communication has severe negative consequences. For example, the lack of consistent teacher communication may cause increased levels of parent frustration resulting in eventually abandoning the educational system.

In “ ‘Parent Involvement is Like Apple Pie’ A Look at Parental Involvement in Two States” A.Y. Ramirez (2001) suggests teacher perceptions and attitudes play a major role in effective communication efforts. Ramirez notes that teachers view communicating with parents by using the Internet not to be a problem because parents who were concerned have opportunities to access the Internet at school or a public library. Additional barriers of communication are evidenced by teachers feeling powerless to carry out quality communication efforts due to the number of students in their classrooms, language differences represented in both the students’ and parents’ inability to speak fluent English, and parents working jobs that do not provide time for quality interaction with teachers (Furger, 2006). Although communication obstacles seem to be prevalent in most school systems, constructive solutions must rise to counter the complexities inherent in school systems. F. Ramirez (2001) notes, “Although

there may be reasons for the lack of effort on the part of schools to communicate with all parents, school-home and home-school communication is essential in creating an understanding of school programs and children's progress" (p.30). Implementation of new technologies can assist not only with clear communication between all parties interested in the educational process, but can seamlessly provide consistent information allowing for the formation of more teacher parent relationships thus demonstrating to the child the value of education.

Traditional and New School Communication Strategies

Berger (2004) provides working definitions of communication systems in schools in the context of explaining the differences between one-way and two-way communication. One-way communication simply acts as a notification system informing parents and students about school activities, issues about educational problems, school wide announcements, and activities. Some examples of one-way communication include school newsletters, static websites, letters, school newspapers, suggestion boxes, and student handbooks. Two-way communication requires the essential component of interaction between participants. Feedback is a natural result of two-way communication, allowing parents and students to voice areas of concern and desires. Examples of two-way communication include, a homework hot line, email, telephone calls, home visits, classroom and school visits. Berger (2004) notes, "The steps to achieve effective communication are easy to implement once the importance of effective communication is acknowledged" (p. 194).

In "Teacher Parent Communication Reforms," Strom and Strom (2002) provide support suggesting current communication systems used to connect

teachers and parents need to be modernized in order to provide a consistent information exchange. This suggestion supports the idea of embracing a cooperative new approach between teachers and parents by using modern technology. This is reflected in the use of mobile phones allowing for instant communication by voice and text messages regardless of the recipient's location.

Strom and Strom (2002) created and tested a new method of teacher to parent communication by creating a cooperative relationship between teachers and parents through the use of a mobile pager system. Although pager systems are rarely used in 2007, this study reflects the use of a mobile communication system to communicate with a predefined audience. They conclude that the use of pager devices shows positive results in an effort to quickly and efficiently communicate with parents regarding student behavior. A detailed summary of the study includes the following main points:

- 90% of the high school faculty report that sending messages to parents by use of a pager was more effective than by telephone.
- 93% of parents indicated the timely manner of the pager message helped in creating constructive solutions to assist their children.
- 100% of parents communicated with their children about the pager message.
- 97% of parents, 93% of teachers, and 82% of students (children) agree that pager messages can improve the school-home relationship (Strom & Strom, 2002).

The results of this study have large-scale ramifications for the future use of mobile type communication methods for educational purposes. Consistent

communication of information from teacher to parents is required in order to keep both parties working collaboratively, and in fulfilling appropriate shared roles of providing guidance with the common goal of educating the child.

Part Two

General Description of Mobile Messaging

M-communication, Short Message Service (SMS), or text messaging are descriptors that refer to the technological communication style that embraces the act of mobile messaging. Text messaging in general provides the individual the ability to communicate in a non-vocal, expressive way by sending a message using a maximum of 160 characters per SMS message (Soriano, Raikundalia, & Szajman, 2005). Text messages are delivered almost instantly on the recipient's cell phone. Text messages are generally accepted as being less intrusive than cell phone voice calls (Leong et al., 2006). It is a relatively cheap, quick, and efficient way to communicate with an individual, group, or bulk audience instantly regardless of the physical location of the receiver of the message. A quarter of the population of the world uses cellular phones, and SMS use is exploding with significant potential still ahead in North America and China (Turel, Serenko, & Bontis, 2007).

It is clear according to the related literature that mobile communication tends to lead to a greater volume of communication, thus transforming the nature of relationships personally and professionally. By reviewing mobile message use in the United States between 2004 and 2006, it is also evident that mobile

messaging is beginning to play a pivotal role for both individuals and institutions. For example, 4.7 billion text messages were sent each month in 2004 compared to 7.3 billion messages in 2005, increasing to 12.5 billion messages in 2006 (Cellular Telecommunications & Internet Association (CTIA), 2006; Steeh, Buskirk, & Callegaro, 2007).

The application of text messaging is classified as an interactive-goal directed mobile type service. Interactivity occurs when a person interacts with a medium while having the ability to modify content in real time (Nysveen, Pedersen, & Thorbjornses, 2005). Text messaging is also a goal directed activity. Goals achieved through text messaging are driven by the user's individual motivation to benefit from mobile technology. Motivational factors to use text messaging directly parallel the benefits of a goal directed framework. Usually motivated by utilitarian benefits, text messaging allows for the personal-individual fulfillment of goals, usually corresponding to real life application uses that involve the coordination or planning of activities in everyday life (Grinter & Eldridge, 2003). To further support the motivational issues of text messaging from a utilitarian lens, ease of use of the physical design (functions) of mobile devices will be necessary in order to attract and retain a high percentage of text message users (Nysveen, Pedersen, & Thorbjornses, 2005; Soriano, Raikundalalia, & Szajman, 2005).

International Usage

European and southeast Asian countries tend to possess advantages in relation to telecommunication infrastructure and cost effectiveness compared to the United States in regards to mobile messaging. This has resulted in exponential

growth of mobile messaging (Grinter & Eldridge, 2003). Because of the growth, societal acceptance, and youth participation, there has been a proliferation of research in mobile messaging usage in the personal and school realms in European nations such as the United Kingdom, Norway, Finland, and Japan. These studies primarily examined how mobile messaging has become embedded in life of teenagers (Grinter & Eldridge, 2003). European nations have a telecommunications infrastructure call the Global System for Mobile communication (GSM) standard which enables all mobile phones, regardless of carrier, model, or cellular payment plan, to receive mobile messages. From a cost effective lens, it is cheaper to send and receive a text message in Europe than make a phone call. Continuing to examine the cost effective rationale, southeast Asian countries, such as China, mirror the exponential growth of mobile messaging of European nations (Hamill & Amparo, 2005; Zhang & Prybutok, 2005). This has come as a result of computers and access to the Internet being expensive. Evidence suggests that even those with computers rarely check email.

A review of the research demonstrates that in comparison to European nations, there is a dearth of research in the United States on the social impacts of text messaging. Until recently, the U.S. has lagged behind in the use of mobile messaging as a result of inconsistent payment and features plans by cellular carrier companies as well as incompatible cellular networks resulting from the lack of government regulation of wireless telecommunication companies (Zhang & Prybutok, 2005). Until recently, the popularity of instant messaging (IM) in the United States has filled the void of mobile messaging (Ling, 2004). Zhang and

Prybutok (2005) conclude that the use of mobile messaging will grow in the United States as email becomes more accessible on mobile phones.

Because of ample research conducted and a proven longevity of mobile message usage in European nations, it is appropriate in this literature review to include specific studies conducted in European nations. Ling (2004) examined the role of mobile communication systems in Norway where, since the late 1990s, the use of text messaging on cellular phones has seen phenomenal growth. Short Message System (SMS) has become central to teenage use of mobile cellular telephones (Ling, 2004). Text messaging allows for consistent communication at a relatively inexpensive price and fosters expressive communication between individuals in environments where perhaps other forms may not be appropriate. Ling states that text messaging allows individuals to get quick reminders, notify friends or parents of recent events, or to simply check-in and coordinate everyday events. According to Ling (2004), "Texting is a coordination tool more discrete than other forms of interaction. In short, texting is a living medium" (p. 147). Other studies by Ling described the kinds of messages that are being sent. According to a study of 883 messages from a random sample of Norwegian SMS users, one in three text messages was used to coordinate activities or meetings; 17% of the messages were simply quick, usually informal messages that were simple exchanges, and questions and answers made up about 25% of all the messages in the study (Ling, 2004).

Ling concludes with a belief that today's teens and young adults employ mobile messaging technology to restore communication possibilities and turn to text messaging for immediate connections. Suited for nomadic humans, text

messaging assists lifestyles that require continual movement and allow for spontaneity in planning. Perhaps text messaging will simply be a phase in society, Ling speculates, much like changing fashions in clothing attire.

Mobile Messaging: Gender, Age, and Ethnicity

The Pew Research Center, an independent research group that studies public opinion toward media, politics, and public policy, provides significant research data that lays the foundation for modern interpretation of digital media usage. Few studies examine the content of text messages and how text messaging relates to gender issues. According to Rainie and Keeter (2006), men and women are equally likely to send and receive text messages. Raine (2006) showed that the content or type of text message might be different based on gender. Men are more likely to use short, one-word answers in planning for events in the future in their SMS messages compared to women who are more likely to use SMS in the immediacy or specific to that moment. Also, women are more likely to send SMS messages that entail emotion.

What teenagers value in regards to digital technology can be ascertained by a review of the ownership levels of specific digital media devices (Amanda, Madden, & Hitlin, 2005). These authors conclude there is a more significant difference perceived in mobile phone ownership based on age rather than on gender.

Figure 2.2

Percentage of Each Group Who Have Media Devices

| | <i>All teens</i> | <i>Boys</i> | <i>Girls</i> | <i>Teens-aged 12-14</i> | <i>Teens- Aged 15-17</i> |
|------------------------|------------------|-------------|--------------|-----------------------------|----------------------------------|
| Desktop computer | 73% | 75% | 71% | 69% | 76% |
| Laptop Computer | 18% | 17% | 19% | 18% | 18% |
| Cell phone | 45% | 40% | 49% | 32% | 57% |
| Sidekick or Blackberry | 7% | 7% | 7% | 7% | 7% |

Source: Pew Internet & American Life Project October-November 2004 survey. $N = 1,100$ 12-17 year-olds. Margin of error is ± 3 percentage points at 95% confidence level.

Evidence of the emergence of mobile messaging, especially by teenagers, is a 45% cell phone ownership rate. The Pew Internet and American Life Project (2006) provided similar findings regarding cell phone use in the United States with particular attention given to the emerging trend of mobile messaging, especially for youth ages 18-29 years of age (Figure 2.2 and 2.3). It is clear that mobile device ownership is a reality, especially among young adults and text messaging is a primary means of communication.

Figure 2.3

Features They Use or Want

| | <i>Ages 18-29</i> | <i>30-49</i> | <i>50-64</i> | <i>65+</i> |
|------------------------------|-------------------|--------------|--------------|------------|
| Use cells for text messaging | 65 | 37 | 13 | 8 |
| Would like this feature | 14 | 14 | 11 | 11 |

Source. Pew Internet & American Life Project, Associated Press, AOL cell phone survey. March 8-28, 2006. $N = 1,503$ (752 contacted on landlines and 751 contacted on their cell phones). In all, 1,286 cell users are in the sample. The margin of error for the cell-using population is $\pm 3\%$ (Rainie & Keeter, 2006).

Teenagers have embraced mobile messaging, especially text messaging, as a primary means of communication. Although still lagging behind in terms of use compared to teenagers in Europe and Asia, 64% of American teens who own a cell phone report they have sent a text message (Amanda, Madden, & Hitlin, 2005). These authors provide evidence of the trend of text messaging becoming more of a dominate communication medium from the age of 12, where 17% report text messaging, to 34% of 14 year olds, 45% of 15 year olds, and 54% of 17 year olds. Interestingly, Amanda (et al, 2005) found no significant difference in text messaging among racial and ethnic groups or household income. The finding contradicts the data proposed by Rainie & Keeter, (2006) who found that English speaking Hispanics tended to text message at a higher rate than whites or blacks.

There is limited research that investigates the use of mobile messaging for middle-aged users (35-60 years). The majority of research investigates use by teenagers and young adults. “A Usability Study of Short Message Service on Middle-Aged Users” by Soriano, Raikundalia, and Szajman (2005) concluded that

middle-aged users are influenced by text messaging if message related content is easy to access and reflects a clear and consistent format. Design features such as a large keypad layout and screen were significant factors in mobile message usage by middle-aged users (Kurniawan, Nugroho, & Mahmud, 2006; Soriano, Raikundalalia, & Szajman, 2005) . The study also reflects the need for text messaging to be a practical tool that has the ability to save time. One other factor germane to mobile phone usage by middle-aged users included a guaranteed delivery of communication content using text messaging versus voice. From a positive perspective, middle-aged users indicated an appreciation for mobile messaging when it allowed quick and short communication that is unobtrusive.

Kurniawan, Nugroho, and Mahmud (2006) conducted an exploratory, mixed methods study to examine how mobile phone designs can be improved to help older persons in the UK. This study examines a non traditional older person demographic customarily absent from most mobile phone usage studies thus adding a new body of knowledge already filled with teenage or young adult research data. The study generated the following results which reflected rare use of text messaging by older persons and further noted that older people who use mobile phones prefer physical elements of a mobile phone that translated into practical usability as opposed to aesthetic aspects such as color or specialized designs that lack practical uses.

In addition to reviewing academic research, it is important to evaluate how private enterprise interprets the relationship between age and mobile phone use. Additional sources provide similar findings linking the age with mobile phone operational use. According to a survey conducted by comScore (Networks,

2007), a private global digital technology information provider, mobile phone users can be divided into three distinct groups: (a) the cellular generation, ages 18 to 24, generally raised with mobile phone awareness and use of cell phones as part of everyday life, (b) a transition group, ages 25 to 34, mobile phones generally entered lives in early adulthood, and (c) the adult adopters group, age 35 or older, exposed to mobile phones during adulthood preferring to use only basic features. It seems that comScore Network's primary research focus is to investigate the behavior and attitudes of wireless phone subscribers, thus resulting in a quick and clear snapshot of mobile phone usability groups. This study provides further evidence of the significant impact mobile phones have had on life depending on age. It can be assumed that this will have natural consequences on the use of mobile messaging based on age group.

Findings indicate that English-speaking Hispanics use text messaging at a higher rate than whites or blacks (Figure 2.4). There is data that suggests that 32 % of nonwhites would have difficulty communicating without their cell phones compared to 24% of whites (Rainie & Keeter, 2006). The research makes a valuable disclaimer that the Hispanic population that participated in the study spoke fluent English due to the survey being conducted in English.

Figure 2.4

Profiles of Whites and Non-Whites

| | <i>Send and Receive Text Messages</i> | <i>Would Like This Feature</i> |
|---|---------------------------------------|--------------------------------|
| Whites (N = 979) | 31% | 13% |
| Blacks (N = 156) | 42% | 13% |
| English Speaking Hispanics (N = 109) | 54% | 11% |

Source. Pew Internet & American Life Project, Associated Press, AOL cell phone survey. March 8-28, 2006. N=1,503 (752 contacted on landlines and 751 contacted on their cell phones). In all, 1,286 cell users are in the sample. The margin of error for the cell-using population is $\pm 3\%$. (Rainie & Keeter, 2006)

*Beginnings of Mobile Communication Research and the Role in Education**Environments*

Katz (2006) maintains that social science research on mobile communication lags behind computer and Internet use. Katz outlines emerging research trends of mobile communication technology. Researchers significant to this area of study include Hans Geser, a Swiss researcher who pioneered some of the original studies examining the sociology of mobile technology, and Leslie Haddon, who is actively examining the role of mobile technologies in the domestic sphere or household (Katz, 2006b). Areas of future research identified by Katz include mobile technology's developing role in democratizing social organizations by providing new avenues of information dissemination. This suggestion serves as further justification for researching the impacts of mobile messaging in educational environments.

"Magic in the Air: Mobile Communication and the Transformation of Social Life" by James E. Katz (2006) describes how mobile phones impact

educational settings. Katz is cited throughout academic journals as being a leader in the field of mobile communications. He is the director of the *Center for Mobile Communication Studies* at Rutgers University. According to Katz (2006b), it has become increasingly clear that students in our present classrooms can now communicate with the world beyond the classroom. Some educators believe students can only learn successfully in controlled environments where dictated values and behaviors must be embraced in order for the educational process to unfold. Digital mobile technology, Katz argues, are necessitating changes in this type of educational structure and philosophy.

The mobile phone has traditionally been associated with a cause of irritation and delinquency, especially at the secondary level (6-12 grades). School policy design created by educational administration has generally reflected policies that ban the use of mobile phones and pagers on school premises. Early policies have not recognized the potential positive uses of mobile phones as part of the curriculum or to assist in communication with parents and students. As a result of the school shootings in Columbine, Colorado in 1999, and the terrorist attacks in the United States of September 11, 2001, parents have pressured school authorities to allow mobile phones in schools for safety concerns (Katz, 2006b).

Katz (2004) outlines the usefulness of mobile phones in educational settings. High schools are beginning to use mobile technologies in education settings such as providing mobile dictionaries to assist students. Mobile applications are increasingly being used to connect teachers and parents regarding attendance and provide general school updates. Also, School administration can delegate information and tasks to students and teachers on demand.

In “Mobile Scaffolding: An Experiment in Using SMS Text Messaging to Support First Year University Students,” Andy Stone summarizes research completed in 2003 in which 14 freshman at Kingston University in the UK requested the use of text messaging (SMS) to support their educational process. The most highly valued text message received by the students included notifications about deadlines for assignments or examinations, changes in coursework, and changes in class meeting times (Stone, 2004).

Katz (2004) conducted an experiment in order to understand the dependence factor between youth and mobile phones and to better understand the role mobile technology has on their lives. The experiment called for students to not use their mobile phone for an extended period of consecutive days. Out of eighty-two students who participated in the study, only twelve completed the experiment. The study found that the students who did not complete the experiment found it too hard not to use their mobile phones due to personal issues or an urgent responsibility that emerged which required them to use their mobile phones. The results of the study make a clear connection to the dependence factor between youth and mobile phones.

Katz’s work concludes with a significant summary evaluating the consequences of mobile phone communication in education and embracing three levels of mobile communication: (a) operational, easy and effective class management and administration, (b) time-management, coordination between teachers and students, and (c) informative, access to supplemental educational resources. To further support of Katz’s conclusions, in “Wan2tlk?: Everyday Text Messaging,” Grinter and Eldridge (2003) conclude that primary types of

communication content reflected in mobile messages include coordinating events and planning activities which generally lead to face-to-face follow up conversations. What is the relationship between privacy and mobile messages? If mobile messaging is to be embraced by school systems as an instrumental part of the educational process, the issue of message privacy must be addressed. Due to the accelerated growth of mobile messaging, privacy issues are gaining more attention. According to a study conducted by Hakkila and Chatfield (2005), mobile messages were considered to be more private than phone calls, comparing text messages to letters. With privacy being a core issue in the educational process, teachers in a school would find this study to be helpful, especially if text messaging was used to communicate with students and parents about the educational process. Research conclusions found that individuals considered their mobile phones a private type of device and, therefore, mobile messages stored on their mobile device were considered private. Furthermore, those who sent mobile messages expected the receivers to understand there was a level of privacy in each message.

Ling & Pedersen (2005) further explain the challenges that face traditional educational systems:

Classrooms and their culture are ingrained in centuries of institutionalization. Control is a deeply rooted aspect of the learning and teaching cultures of classrooms. Enter a new type of technology, which can be described as mobile, handheld, personalized, discrete and unobtrusive. Some educators are realizing the potential of handheld technology in education, and several research centers are both developing

programs for educational purposes and also researching the implications of handheld technology in education. (p. 238)

School systems can no longer dismiss the reality and power of mobile technology in the lives of students and parents. Emerging Internet technology is allowing for the mobile accessibility of email, text messaging, and access to any information traditionally offered on the worldwide web (Katz, 2006a; Selwyn, 2003). Schools that adopt a fixed educational philosophy usually reflected in authority, dominance, and surveillance structures, will struggle with the socio-technological relationship students have with information. A rigid or fixed educational philosophy runs contradictory to what mobile technologies bring to students' lives. Mobile life characteristics of children and young adults who embrace mobile technologies have lead to the development of new social networks that allow for communication without the need for a fixed location. This will lead to new emerging social relationships and the development of new mobile content availabilities.

The complex feature capabilities of cellular phones are fostering an emerging paradoxical relationship for educational institutions. Enhanced features such as instant messaging (IM), text messaging (SMS) and multimedia messaging (MMS) accompany most cellular phones. These instant forms of communication capabilities can have positive impacts as evidence suggests due to the lack of instant communication between school administration, students, and parents during the tragic events associated with the shootings at Columbine High School in Colorado on April 20, 1999 and at Virginia Polytechnic Institute and State University on April 16, 2007 (Press, 2007). "Getting word out to students also

was the plan at Virginia Tech, where officials have been working on a system that would get emergency alerts to students via text messages on their cell phones”

(Press, 2007, p. 4). Reflecting on national tragic events such as school emergencies provides an opportunity to evaluate current technology uses and to further redefine existing governing policies to both help secure educational institutions while protecting the integrity of the educational process.

The landscape and culture of mobile communication systems are changing faster than current governing policies in regards to the implementation and uses of portable mobile digital devices. A. Dean Pickett and Christopher Thomas (2006) provide three examples of the typical governing policies of most k-12 schools regarding the use of portable electronic communication devices: (a) Restrictive policy; no student shall possess or use an electronic communication device while on school property, (b) Middle-ground policy; students may possess and use cellular telephones and other electronic devices subject to some limitations by the school district, and (c) Liberal policy; students shall be allowed to use electronic communication devices on school grounds, usually without limitation (Pickett & Thomas, 2006). Usability of cellular phone devices is becoming universal, regardless of gender, ethnicity, or age. There is a need for consistent policies that embrace technologies that are readily available for personal use. It will become increasingly important that policies begin to acknowledge the uses of portable technology devices and integrate them into the fabric of educational institutions.

“Schooling the Mobile Generation: the Future for Schools in the Mobile-Networked Society” authored by Neil Selwyn (2004), summarizes the current challenges faced by schools as growing ownership in mobile technologies

becomes a reality in school systems and private life. Although Selwyn's work primarily focuses on the impact mobile technology has had on the United Kingdom, his conclusions may be generalized to most developed western nations. Selwyn concludes that most school institutions have not fully considered the constructive applications of mobile technologies and how they could benefit the educational process.

It has become increasingly apparent in school systems that the future of integrating technology to benefit the educational process could very well be shaped by the mobile devices already in the hands of students and parents. Bridging the gap between the personal use and educational use of mobile technology already owned and operated by students and parents is arguably an increasing reality in school settings. According to Selwyn (2003), "In a physical sense, therefore, schools play little part in students' use of mobile technologies" (pg. 133). Further analysis by Selwyn summarizes the impact of mobile technologies that include autonomy for users coupled with expansion of interaction and a blending of work and leisure.

Significant points of concern surface that deserve more attention that include an examination of how mobile technologies are bridging the relationship between the student, parent, teacher, school, and the outside world. What will be the response of educational systems that embrace a traditional authoritative structure to an increasingly mobile world, embodied by our modern culture? How will school systems maintain order in a world of information that is accessible anywhere, anytime?

CHAPTER III: DESIGN OF STUDY

The goal of section three of this dissertation is to provide a clear and complete description of the specific steps that were taken to address my research questions and hypotheses. The design of study contains the following six subsections; Methodology and Method, Data Needed, Threats to Internal and External Validity, Methods to Achieve High Rates of Student and Parent Response, Statistical Analysis, and the Strategies to Protect Human Subjects.

Methodology and Method

No information is more important to most organizations, including businesses, than quantitative information--the numbers that measure performance, identify opportunities, and forecast the future. (Pew, 2007 ¶ 2)

This subsection of the design of study provides justification for the methodology used for the study. It is generally believed that quantitative research produces evidence in the form of numbers that measure performance, identify potential future research opportunities, and assist in making predictions about the future. The selection of a quantitative study allows for the specific measurement of cause and effect relationship. The methodology selected for this quantitative study was positivism utilizing an experimental method 4x4 Latin square design, four types of text messaging interventions for treatment purposes, and a computer based teacher grade book as the primary technique to gather data. The use of instruments to collect data was consistent with a positivist framework. Positivism as a philosophy reflects the idea that reality can be measured. This study attempted to “eliminate bias and to select a representative sample from the

population—all aspects of a positivist methodology. One also establishes ‘cause and effect’ in the positivist methodology” (Creswell, 1994). This use of positivism best reflects the purpose and design of this quantitative study.

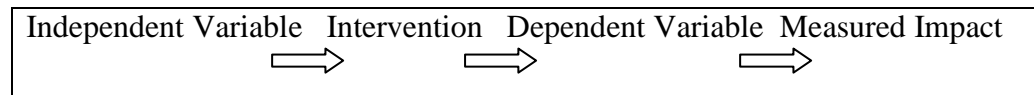
The method subsection of this study describes the rationale for selecting experimental research while, more specifically, using the Latin square design to allow for the evaluation of four levels of text message interventions. This section also includes a description of research questions, null hypothesis statements, independent and dependent variables, and the 4x4 Latin square design.

Experimental Research

The basic idea underlying all experimental research is really quite simple: try something and systematically observe what happens. (Fraenkel & Wallen, 1996)

The essential characteristics of experimental research have been hailed as the most powerful method that exists in studying cause and effect relationships. At the root of experimental research are two requirements. First, at least two conditions or methods (usually more) are compared to evaluate the impacts of an intervention or independent variable. Second, the researcher manipulates the independent variable. The researcher plans the manipulation in order to study the effects on the dependent variable or more specifically, a causal type of relationship. Simply, experimental research is used to examine causal type of research questions or cause and effect scenarios.

Figure 3.0

Experimental Research Model

True experimental research calls for the independent variable to be directly manipulated to measure its impact on a dependent variable while subjects are randomly assigned to different groups that receive different interventions. The randomization of subjects to receive different treatment levels is sometimes referred to as randomized field trials or randomized controlled trials (A Policymaker's Primer on Education Research: How to Understand, Evaluate, and Use It, 2004).

Research Questions, Corresponding Hypotheses Statements, Independent and Dependent Variables

In order to provide a clear description of how the use of an experimental design was applied to this study, it is required to a review the research questions (Figure 1.0), corresponding null hypothesis statements, and a full description of the independent and dependent variables.

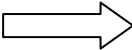
The three research questions formed during the origins of this study specifically investigated the impact of four levels of text message intervention (independent variable) on student assignment completion rate (dependent variable). (1) Is there a significant difference in student assignment completion rate if students receive text messages on their cell phones regarding class assignments? (2) Is there a significant difference in student assignment completion rate if parents receive text messages on their cell phones regarding

class assignments? (3) Is there a significant difference in student assignment completion rate if both parents and students receive simultaneous text messages on their cell phones regarding class assignments?

A 4x4 Latin square design allows for the examination of the original research questions listed above in addition to examining three null hypotheses statements. (1) There is no significant difference in assignment completion rate between the four levels of text message interventions. (2) There is no significant difference in assignment completion rate between semester weeks. (3) There is no significant difference in assignment completion rate between different teachers.

Figure 3.1

Research Questions and Null Hypotheses

| <i>Research Questions</i> | <i>Null Hypotheses</i> |
|---|--|
| Question 1. Is there a significant difference in student assignment completion rate if students receive text messages on their mobile phone regarding class assignments? | Null Hypothesis 1. There is no significant difference in assignment completion rate between the four levels of text message interventions. |
| Question 2: Is there a significant difference in student assignment completion rate if parents receive text message on their mobile phone regarding class assignments? | |
| Question 3: Is there a significant difference in student assignment completion rate if both parents and students receive simultaneous text messages on their mobile phones regarding class assignments? | |
| Added as a result of Latin-square design  | Null Hypothesis 2. There is no significant difference in assignment completion rate between semester weeks. |
| | Null Hypothesis 3. There is no significant difference in assignment completion rate between different teachers. |

The independent and dependent variables in this study meet three criteria required in order for the study to reflect quantitative analysis.

1. The observations can be measured.
2. The observations have a natural order or ranking.
3. The observations have a numerical value for data collection purposes.

The variables are considered to be discrete because values of study have fixed parameters as opposed to continuous variables that reflect values that have a range of possibilities.

Figure 3.2

Independent and Dependent Variables

| <i>Independent Variables (IV)</i> | |
|-----------------------------------|--|
| ↓ | |
| TM Intervention A (c_1) | Text message sent to students and parents corresponding to a specific assignment. |
| TM Intervention B (c_2) | Text message sent to students corresponding to a specific assignment. |
| TM Intervention C (c_3) | Text message sent to parents corresponding to a specific assignment. |
| TM Intervention D (c_4) | (Control Group) Text message sent to parents and students that is non-assignment in focus. |
| <i>Dependent Variable (DV)</i> | |
| ↓ | |
| Student Assignment Completion | |

Note. TM = Text Message

This study measured the impact on student assignment completion rate by using four interventions in the form of text messages delivered to the cell phone of parents and students. The TM (text message) interventions were sent from high

school teachers ($N = 4$) to students and parents of a specific class. The four interventions corresponded to the content of the text message. The content of TM intervention A, B, and C correlated with specific student classroom assignments while intervention D, was non-assignment specific content (Figure 3.2).

4x4 Latin Square Design

The 4x4 Latin square design used for this study allowed for repeated and random measurement of multiple independent variables in different orders distributed evenly to participants in the study. The 4x4 Latin square design was selected for several reasons. First, Latin squares minimized unwanted influencing factors and ensured that the impacts of the treatments were statistically isolated resulting in a design that makes certain that over the course of the experiment, all possible combinations of treatments were used once for every participant. Second, Latin squares allowed for the examination of two or more independent variables. Third, studies that employ a 4x4 Latin square design are considered randomized studies because of the random assignment of interventions dictated by the Latin square configuration, which counterbalances the sequences in which the intervention occurs (Moore, 1979). The counterbalance of each intervention is dictated by the position of each intervention on the Latin-square. This provided an opportunity to conduct repeated measurements. In addition, the design allowed for in depth evaluation of the effect of the intervention's position or position effect in the Latin-square (Tabachnick & Fidell, 2001). Figures 3.3 and 3.4 represent the 4x4 Latin square matrix used in this study. It is a balanced classification scheme that is usually represented by a square matrix.

Figure 3.3

Balanced Classification Latin-Square

| | b_1 | b_2 | b_3 | b_4 |
|-------|-------|-------|-------|-------|
| a_1 | c_1 | c_2 | c_3 | c_4 |
| a_2 | c_2 | c_4 | c_1 | c_3 |
| a_3 | c_3 | c_1 | c_4 | c_2 |
| a_4 | c_4 | c_3 | c_2 | c_1 |

| a_1 = Weeks 1-3 | a_2 = Weeks 4-6 | a_3 = Weeks 7-9 | a_4 = Weeks 10-12 |
|---------------------------|---------------------------|---------------------------|---------------------------|
| b_1 = Teacher 1 | b_2 = Teacher 2 | b_3 = Teacher 3 | b_4 = Teacher 4 |
| c_1 = A TM intervention | c_2 = B TM intervention | c_3 = C TM intervention | c_4 = D TM intervention |

This layout preserves the structure of one intervention in each row and column. There are 16 observations. Observations originated from four 3-week semester sessions multiplied by four teachers. Latin square designs provide precision in measuring the effects of interventions because we can block interventions based on two factors (Kuehl, 2000). Each row and column of the Latin square are identified as two blocking factors. Figure 3.4 displays the matrix with appropriate labels for TM interventions A, B, C, and D and the blocking factors are Teachers 1, 2, 3, and 4 and Semester Weeks 1-3, 4-6, 7-9, and 10-13. Blocking factors are used to control sources of extraneous variables that may have an effect on the conclusions of the study. By blocking factors, the design allows for a counterbalance of levels and order of intervention implementation, thus controlling extraneous variables.

Figure 3.4

Latin-Square Matrix with Intervention Placement

| <i>Teacher/Week</i> | <i>Teacher 1</i> | <i>Teacher 2</i> | <i>Teacher 3</i> | <i>Teacher 4</i> |
|----------------------|------------------|------------------|------------------|------------------|
| Semester Weeks 1-3 | Intervention A | Intervention B | Intervention C | Intervention D |
| Semester Weeks 4-6 | Intervention B | Intervention D | Intervention A | Intervention C |
| Semester Weeks 7-9 | Intervention C | Intervention A | Intervention D | Intervention B |
| Semester Weeks 10-12 | Intervention D | Intervention C | Intervention B | Intervention A |

Figure 3.4 reveals a matrix with a total of three variables, each having four levels. This was used to test the application of four different TM interventions A, B, C, and D (variable 1) using four teachers (Teacher 1, 2, 3, and 4) (variable 2) using one at a time, four different application methods that correspond to the time period or order (Semester Weeks) (variable 3). In this matrix design, each of the four TM interventions A, B, C, D appears once in each column, and each of the four TM interventions A, B, C, D appears once in each row of the matrix. The Latin square design is considered a restrictive design because it is mandatory that the number of treatments, rows, and columns to be equal values.

The Latin square matrix allows for repeated interventions to be measured more than once on different subjects. Repeated measurements must take into account the position effects of the interventions. Position effect directly corresponds to the interventions placement in the Latin square matrix. Tabachnick (2001) describes, “position effects are unavoidable in a repeated-measure design in which cases are necessarily measured more than once” (p. 481). Latin square

designs allow for the removal of potential placement effects by positioning interventions in different orders.

This study is considered a random Latin square design. TM Interventions A, B, C, and D are randomly distributed based on intervention placement in matrix. Figures 3.4 and 3.5 provide an example of random assignment of interventions for each block. The steps that provide randomization of the Latin square and corresponding matrix include: a) randomly select one of the standard squares, b) randomly order all but the first row, c) randomly order all columns, and d) randomly assign treatments to the letters. (Kuehl, 2000)

Figure 3.5

Random Assignment of Intervention Per Block

| | | | |
|-----------|-----------|-----------|-----------|
| c_1 (A) | c_2 (B) | c_3 (C) | c_4 (D) |
| c_2 (B) | c_4 (D) | c_1 (A) | c_3 (C) |
| c_3 (C) | c_1 (A) | c_4 (D) | c_2 (B) |
| c_4 (D) | c_3 (C) | c_2 (B) | c_1 (A) |

Data Needed

Site Selection

The selection of school sites used in this study is limited to immediate availability convenience in regards to access by the researcher. Two traditional comprehensive grades 9-12 high schools, located in the state of Oregon within the same city limits, represent the research sites for this study. The U.S. Department

of Education's National Center for Education Statistics provides enrollment figures by grade, racial and ethnic populations, student-teacher ratio and other demographic information for each U.S. school or district. The U.S. Department of Education's Common Core Data (Table 1) compares the two research school sites used in this study.

Table 1

Site 1 and Site 2 Demographic Profiles

| <i>Common Core Data (CCD)</i> | <i>Site 1</i> | <i>Site 2</i> |
|-------------------------------|---|--|
| Grades | 9-12 | 9-12 |
| Total # of students | <i>N</i> = 1430 | <i>N</i> = 1246 |
| Classroom Teachers (FTE) | <i>N</i> = 61.0 | <i>N</i> = 52.0 |
| Student/Teacher Ratio | <i>N</i> = 23.4 | <i>N</i> = 24.0 |
| Type of School | Regular | Regular |
| Locale | Mid-size city | Mid-size city |
| Charter | No | No |
| Magnet School | No | No |
| Title I School | Yes | Yes |
| Title 1 School Wide Program | No | No |
| Enrollment by grade | 9 372 10 395 11 346 12 317 | 9 345 10 326 11 322 12 253 |
| Enrollment by Race/Ethnicity | Amer Indian / Alaskan = 8 Asian = 13 Black = 13 Hispanic = 92 White = 1,304 | Amer Indian Alaskan = 13 Asian = 25 Black = 11 Hispanic = 45 White = 1,152 |
| Enrollment / Gender | Male 683 Female 747 | Male 653 Female 593 |
| Free lunch eligible | 292 | 127 |
| Reduced-price lunch eligible | 113 | 34 |

(National Center for Education Statistics, 2006)

The data from Site 1 and Site 2 indicates two rather homogeneous schools. This is addressed in this study as a threat to the external validity of the study. One exception to the inference of homogeneity is apparent when examining the total number of students eligible for free or reduced lunch at Site 1 ($n = 405$) students compared to ($n = 161$) students at Site 2. This indicates a slightly higher socio-economic level of the general student population that attends Site 2.

Subject Selection and Intervention Procedure

The subjects who received interventions in this study were students and parents. In order to strengthen the validity of this study, the student subjects were selected from standard level academic classes ($N = 4$) completed by the majority of high school students, generally in grades 10 and 11. A goal of this study was to target student subjects that represented a majority of the high school population, thus adding to the validity of the study. Parent subject participation was dependent on student participation as a result of the requirements of TM intervention B and D which required that the student and associated parent receive a TM intervention simultaneously. Figure 3.6 provides detail of the student and parent subjects.

Figure 3.6

Student and Parent Subjects

| | |
|---------------------|--|
| Students | <ul style="list-style-type: none"> -For a student subject to participate in the study, there must be one corresponding parent or guardian in the household that participates. Members of the household determine selection of parent or guardian. -Student subjects: $N = 79$ students out of $N = 120$ student possibilities. -Enrolled in traditional 9-12 grades traditional high school. -Enrolled in four ($N = 4$) regular level academic high school classes: two classes from Site 1 including Biology and U.S. history; two classes from Site 2 including U.S. history and Algebra I -Grade level: primarily sophomore level (grade 10) and junior level (grade 11). -Age of student subjects generally 15-17 years of age. -Required to have possession of a cell phone (for delivery purposes of TM interventions A, B, C, and D). -Required to submit required documents as required by the Institutional Review Board (IRB) process. |
| Parents or Guardian | <ul style="list-style-type: none"> -For a parent or guardian to participate in the study, there must be one corresponding student in the household that participates. -Parent subjects: $N = 79$ determined from the number of student participants. -Parents or guardians of students who are enrolled in 9-12 traditional high school setting. -Parents or guardians of students who are 15-17 years of age. -Required to have possession of a cell phone (for delivery purposes of Interventions A, B, C, and D). -Required to turn in documents as required by the Institutional Review Board (IRB) process. |

Teacher participants ($N = 4$) provided the four TM interventions A, B, C, and D in each of their respective classes. The intervention timeline and description for participating teachers is represented in Appendix A. Teachers sent TM interventions from a computer to the cell phones of parents and students using the email application Gmail™, part of the variety of Google™ online products. Sending text messages from a computer to a cell phone, sometimes

referred to as email to text, is accomplished using the same telecommunication technology as sending an email. For the purposes of this study, participating students and parents were added to each teacher's Gmail address book. Teachers selected the predefined group of students or parents from the email address book as prescribed by the Latin square matrix (Appendix A), typed the text message, and send the text message to the selected parents and students. The address book feature allowed the teacher to send text messages in bulk fashion to students and parents depending on the TM intervention prescribed by the Latin-square matrix (Figure 3.4).

Each teacher ($N = 4$) sent six TM interventions for each three week semester session to an assigned group set forth by the Latin-square. TM interventions A, B, and C content corresponded directly to specific assignments. TM intervention D corresponded to general non-specific class content (Appendix B). Figure 3.2 provides the protocol for each TM intervention. TM interventions were sent to assigned groups in bulk fashion similar to sending an identical bulk email message.

In order to send a text message to a cell phone using an email application, the cell phone company carrier name is needed in addition to the cell phone number of the recipient. After student and parent subjects were confirmed to participate in the study, cell phone carrier and phone number information was collected (see Appendix C and D). Figure 3.7 represents an example of the necessary information the researcher needed to obtain in order to send a text message from an email application. Teachers were trained through regular

consultation with the researcher in order to ensure proper understanding of how to transmit a text message using an email application.

Figure 3.7

Example of Information Required to Send a Text Message Using an Email

Application

| <i>Student Name</i> | <i>Parent name</i> | <i>Cell phone company and email syntax</i> | <i>Cell phone Numbers</i> | <i>Email address</i> |
|---------------------|--------------------|--|---------------------------|---------------------------|
| John Doe | Rick Doe | (s) T-mobile, tmomail.net | (s) 541234567 | 5411234567@tmomail.net |
| | | (p) T-mobile, tmomail.net | (p) 5411234568 | 5411234568@tmomail.net |
| Douglas Smith | Don Smith | (s) Verizon, vtext.com | (s) 5411234590 | 5411234590@vtext.com |
| | | (p) Verizon, vtext.com | (p) 5411234098 | 5411234098@vtext.com |
| Jose Gonzalez | Julia Gonzalez | (s) Cingular, cingularme.com | (s) 5411234587 | 5411234587@cingularme.com |
| | | (p) Cingular, cingularme.com | (p) 5411237561 | 5411237561@cingularme.com |

Use of mobile technologies during the school day is increasingly being regulated by school administration. Student use of cell phones during in class instructional time can result in disruption to the learning process. As a result, teachers sent the TM interventions between 3pm-7pm in order not to disrupt the classroom environment during the school day.

Due to costs associated with ownership of a cell phone, this study assumes that there were students and parents who did not own a cell phone therefore could not participate in this study. Cellular Rural Corporation (Unicel) agreed to provide prepaid cell phones to students and parents at a discounted rate in order to provide the maximum opportunity for participation in this study. A free cell phone device

was given to parents and students with the purchase of a discounted prepaid cellular plan. Providing a discounted cellular prepaid phone plan to students and parents potentially alleviated a proportion of potential non-participants by providing access to cell phone usage.

Data to be Collected and Procedures

The data gathering method used in this study is considered longitudinal. Data indicating assignment completion was collected from the same student subjects at different points of time using a computer grade book over four-three week semester sessions. Specific assignments were recorded in the teacher's grade book. Teachers identified and labeled each participating student in grade book program. This procedure allowed for the monitoring of student assignment completion in accordance with each TM intervention (Appendices E, F, G, H). For each three week semester session, the teacher assigned six assignments and supplemented each assignment with a specific intervention prescribed by the placement on the Latin square matrix (six repetitions for each intervention). It is important to reinforce that the transmission of the TM intervention from teacher to student and (or) parent reflects the placement of the intervention on the Latin square. Assignments completed by the due date were marked with a 1 and assignments completed after the due date or not turned in are marked with a 0. Teacher data collection was guided by a specific set of codes (Appendix I).

Threats to Internal and External Validity

Internal Validity

Internal validity refers to whether the data or conclusions produced by the study are supported by evidence and can be trusted to be consistent with the protocol of the experiment. Did the intervention make a difference? Internal validity looks specifically at the causal evidence that suggests the independent variable had an effect on the dependent variable; did the intervention make a difference? Figure 3.8 describes the specific threats to internal validity as it applies to this study.

Figure 3.8

Internal Validity

| <i>Type as Related to Study</i> | <i>Threat to Study</i> |
|---|--|
| Teacher ability to control assignment that was supported with TM intervention | Student assignment completion rate based on difficulty or level of rigor. The TM intervention was supplemented by assignments provided by different teachers that ranged in difficulty levels. Level of difficulty of assignment may have had a more direct relationship to assignment completion compared to TM intervention. |
| Consent form return and approval | The student and corresponding parent both needed to turn in consent forms in order to be participants in the study. |
| Formation of carryover effect | This is a resulting problem when using the same intervention on multiple occasions. The intervention may have carried over into the next session of testing. Allowing for enough time to elapse between interventions can control carryover effects. Length (time) and school site constrictions did not provide this opportunity. Although, the Latin-square matrix used in this study did not allow for carryover effects because every intervention was followed by every other intervention an equal number of times (Kachman, 2001). The Latin-square was balanced to compensate for carryover effects. |
| Scenario 1 carryover | -B intervention follows A intervention 3 times -C intervention never follows A intervention - If A has a carryover effect, it possibly appeared in intervention B mean but never in the C intervention mean (Kachman, 2001). |
| A B C D B C D A C D A B D A B C | |
| Scenario 2 carryover | This study used Scenario 2 Latin square matrix. Interventions A, B, C, and D followed every other intervention exactly once (Kachman, 2001). |
| A B C D B D A C C A D B D C B A | |

External Validity

External validity refers to the degree to which results from a study can be generalized to other settings, environments, participants and subjects. The two main types of external validity are population and ecological. Population validity examines if the results of a study that targets a specific participant group can be generalized to other participant groups. Ecological validity specifically looks at the likelihood the research study's conclusions can be replicated if exposed to different settings and conditions (Gall, Borg, & Gall, 1996). Figure 3.9 describes the specific threats to external validity as it applies to this study.

Figure 3.9

External Validity

| <i>Type as Related to Study</i> | <i>Threat to Study</i> |
|---|---|
| Population. Study can be generalized to other populations. | Study took place in homogeneous high school sites. Similar racial, socioeconomic, and academic achievement levels of the school sites did not allow for results to be generalized to high school settings that represent significant differences in demographics. |
| Population. Personological variables interact with intervention effects. | It may be possible that assignment completion rates may be a result of student academic achievement level or different grade level. |
| Population. Variable levels of parent involvement. | Parent participants may have existing characteristics that reflect productive communication with students thus resulting in a minimization of the impacts of TM intervention level. This reflects an assumption that a motivated student has motivated parents. |
| Ecological. The Hawthorn effect causes subjects to perform differently because they know they are being studied (Gall, Borg, & Gall, 1996). | Students were aware that they were part of an experiment using different TM intervention levels. It is possible that students turned in assignments, regardless of intervention, simply because they knew they are being studied (Gall, Borg, & Gall, 1996). |
| Ecological. The experiment effect occurs because the person implementing it. This could vary from subject to subject. | Teacher communication with students about assignment expectations and due dates varied depending on teacher instructional techniques. Repeatedly discussing assignments and respective due dates in a classroom environment may have outweighed TM intervention. |
| Ecological. The novelty effect may occur because the intervention is novel and the subjects respond due to the newness or distinctiveness. | Students and parents were exposed to a new technology communication tool. The ability of students and parents to receive school assignment information instantly on their cell phones is considered a new and distinctive communication avenue therefore may have had a significant response level. |

Methods to Achieve High Rates of Student and Parent Response

This study required simultaneous participation of both parents and students receiving TM interventions. Students and parents were informed about being part of a unique innovative scientific study that used mobile technology to increase communication between teacher and student. As required by the Institutional Review Board (IRB), which approves the experimentation of human subjects (Appendix J) in order to ensure researcher procedures align with the highest ethical standards, parents, students and teachers were required to return signed assent (students) and consent (parents/teachers) forms which indicated agreement to participate in the study (Appendices K, L, M). In order for this study to have an adequate subject population, it was imperative that a high percentage of assent and consent forms were returned from the student and parent. In addition, support for this study was required from school principals and the school district superintendent (Appendices N, O, P).

Students

Students received a full explanation of the study by the researcher and teacher of record. Students received an assent form, a modified condensed version of a consent form approved by the IRB, which summarized the study and asked for approval or denial to participate in the study. A full explanation of the potential benefits was provided to all students (Appendix Q). The teacher of record for each class was required to demonstrate support for this study in order to foster student interest in participation. Student assent forms were gathered during class in order to guarantee a high rate of participation.

Parents

Parents received a letter in the mail describing the study and the unique opportunity to learn about the impacts of text messaging on student assignment completion. The study allowed parents to further understand the benefits of increased communication between teacher, parent, and student while assisting academic progress of their child. Parents received a consent form (Appendix L), approved by the IRB, calling for approval or denial to participate in the study. Consent forms were delivered to the parent by the student (their respective child) and the U.S. Postal Service. Parents were contacted by phone to confirm that they received the consent form and also to answer any questions about the study.

Statistical Analysis

“The basic question in any Latin-square analysis is whether there are reliable mean differences in the dependent variable as a result of different treatments” (Tabachnick & Fidell, 2001).

The ultimate goal of statistical analysis is the prediction of observable quantities. For the statistical analysis portion of this study, a 4x4 repeated measure Latin-square ANOVA provided tests of mean differences among the different independent variables while helping to determine statistical significance. Results of the data were analyzed using ANOVA by use of SPSS statistical software version 15.0. The Latin square analysis is typically used in the research fields of agriculture that reflect two dimensional geographical grid designs in a field.

A 4x4 Latin square ANOVA allowed testing for four sources of variation. (1) The measurement of how TM intervention results vary. (2) The measurement of how the row (Semester Weeks 1-3, 4-6, 7-9, and 10-12) results vary. (3) The measurement of how the column (Teachers 1, 2, 3, and 4) results vary. (4) The collective measurement of how scores (assignment completion mean) vary within their respective interventions.

Strategies for Protection of Human Subjects

It is the researchers responsibility to comply with the standards established by the National Institutes of Health (NIH) for the protection of human participants in research. At Oregon State University, the Institutional Review Board (IRB) is the responsible governing board that ensures that the NIH standards were met for this study.

The study was designed in accordance with policies that govern the IRB at Oregon State University and was granted approval to begin experimentation (Appendix J). By students and parents completing the IRB approved consent (parent) and assent (student) forms, they gave their consent to participate. Participants in this study were provided with information, including any foreseeable risks, the nature of procedures, and potential benefits of the study. Participation in the study was voluntary. Participants could opt out of the study at any time. The confidentiality of the teachers, students, and parents was protected. The researcher and the researcher's major professor and other committee members' worked to ensure the design of the study protected the anonymity of all

participating members. Individual student assignment completion data is confidential and protected. The identities of the school sites and teacher participants will not be released without written permission of the participants.

The following conditions must be followed in order to maintain IRB approval: a) all participants in the study must receive the IRB stamped informed consent document, b) any changes to the approved consent forms, data collection procedures, research staff, subject recruitment, or increase in the number of participants must be submitted for IRB approval before implementation, c) adverse effects must be reported within three days of occurrence during the study. This includes any adverse outcome that has negative impacts on the general welfare of human participants that is not expected, and d) any departure from the approved study must be reported to the IRB within 10 business days of occurrence or when discovered.

Figure 3.10

Timeline Toward Dissertation Completion

| |
|--|
| September 2005 – August 2007 Complete coursework required for PhD in Education |
| June 2007 Complete Library Presentation (Preliminary written exams) |
| June-August 2007 Complete work on Methods and work on IRB materials |
| August 2007 Gain IRB approval for dissertation study |
| August 2007 Present dissertation study to committee |
| September 2007 Distribute and collect consent (parent) and assent (student) forms as required by IRB and produce list of participating subjects of study |
| October 2007 Begin experimental phase of research study |
| January 2008 Complete experimental phase of research study |
| February 2008 Collect data from teachers |
| March 2008 Analyze the data with statistical software and develop preliminary Conclusions |
| April 2008 - April 2009 Complete the revisions and final draft of dissertation |
| May 2009 Defend research and dissertation with committee |

Summary of Design of Study

Modern forms of mobile communication may prove to impact a teacher's ability to quickly and effectively contact parents and students, thus influencing student achievement. This study was intended to test the potential of text messaging as an avenue for teachers to communicate with parents and students about class related assignments. A quantitative approach was selected for this study, which naturally aligned with a positivist methodology. Criteria for truth is reflected in the data collection evidence, attained through repetition and measurement, associated with student assignment completion as a result of TM interventions. The study used an experimental research method to answer three research questions.

1. Is there a significant difference in student assignment completion rate if students receive text messages on their cell phone regarding class assignments?
2. Is there a significant difference in student assignment completion rate if parents receive text messages on their cell phone regarding class assignments?
3. Is there a significant difference in student assignment completion rate if both parents and students receive simultaneous text messages on their cell phone regarding class assignments?

A 4x4 Latin square design was selected for this study because it allowed for repeated and random measurement of multiple independent variables in

different orders distributed evenly to participants in the study (Figure 3.4). The 4x4 Latin square design allowed for the testing of the three null hypotheses.

1. There is no significant difference in assignment completion rate between the four levels of text messages.
2. There is no significant difference in assignment completion rate between semester weeks.
3. There is no significant difference in assignment completion rate between difference teachers.

The review of the literature demonstrated the emerging uses of mobile communication with emphasis on text messaging, especially in youth and middle-aged adults. The review of the literature also provided evidence linking the importance of effective communication between teachers, parents, and students to student academic improvement.

Teachers ($N = 4$) representing two high schools (Site 1 and Site 2), gathered data in regards to student assignment completion. Data was collected indicating the relationship of interventions and assignment completion over a 12 week period. Assignment completion represents the dependent variable and four levels of intervention represent the independent variables. The statistical analysis conducted in this study is a Latin square ANOVA test. This test allowed for the statistical analysis of data to demonstrate a significant difference in assignment completion means in relationship to the four levels of interventions, semester weeks (length of experiment), and compared assignment completion means between different teachers. Internal and external threats to validity were addressed and were minimized in this study due to the use of the Latin square 4x4 design.

The Institutional Review Board (IRB) approved this research study, indicating that the guidelines set forth align with the National Institutes of Health (NIH) which monitors the protection of human subjects were met. The analysis of results from the data collected is available upon request to educational institutions in order to add to the existing body of knowledge demonstrating the impacts of increased communication through the use of mobile technology.

CHAPTER IV. RESULTS

Chapter four presents the data collected from high school teachers ($N = 4$) using a coding system (Appendix I) measuring student assignment completion correlated to text message (TM) interventions A, B, C, and D. TM intervention A = specific assignment text message to both parents and students, TM intervention B = specific assignment text message to students only, TM intervention C = specific assignment text message to parents only, and TM intervention D = non-specific text message assignment to both students and parents. Chapter four is organized in the following sections: (1) demographics, (2) descriptive statistical results as determined by research question, teacher participants, and student grade level and gender, (3) frequency distributions by TM interventions, and (4) inferential statistical results using a Latin square analysis of variance (ANOVA).

The focus of this research study was to examine the impact of high school teachers using text messaging as a means to communicate with students and parents about class assignments. The primary goal of the research study was to provide evidence of the impact text messaging has on student assignment completion rates at the high school level. The research questions were:

1. Is there a significant difference in student assignment completion rate if students receive text messages on their mobile phones regarding class assignments?
2. Is there a significant difference in student assignment completion rate if parents receive text messages on their cell phones regarding class assignments?

3. Is there a significant difference in student assignment completion rate if both parents and student receive text messages on their cell phones regarding class assignments?

The three null hypothesis statements correspond directly to the research questions and naturally align with the Latin-square design matrix used in this study.

1. ($H_0 : \mu_1 = \mu_2$) states there is no significant difference in assignment completion rate (mean) between TM interventions A, B, C, and D.
2. ($H_0 : \mu_1 = \mu_2$) states there is no significant difference in assignment completion rate between semester weeks.
3. ($H_0 : \mu_1 = \mu_2$) states there is no significant difference in assignment completion rate between different teachers.

Descriptive and inferential statistics were used in order to analyze and discuss the data collected. The Statistical Package for Social Sciences (SPSS) 15.0 was used to perform the inferential analysis of the study. For the purposes of presenting and interpreting the data results of the chapter, it is important to note that for each student participant there is an accompanying parent participant (1:1 student to parent). This is a result of the TM intervention A, C, and D requirements, which requires each participating student subject to have an accompanying parent to receive a text message during the study.

Demographics

The demographics of the high school teachers ($N = 4$) and student and parent participants ($N = 79$) are presented in Tables 2, 3, and 4.

Table 2

Teacher Participant Demographics ($N = 4$)

| <i>Teacher</i> | <i>Gender</i> | <i>Race</i> | <i>Age</i> | <i>Teaching Years</i> | <i>Site</i> | <i>Content</i> |
|----------------|---------------|-------------|------------|-----------------------|-------------|----------------|
| 1 | Male | White | 45 | 21 | 1 | Biology |
| 2 | Male | White | 36 | 8 | 2 | US history |
| 3 | Female | White | 42 | 13 | 2 | Algebra I |
| 4 | Female | White | 30 | 6 | 1 | US history |

Each grade 9-12 high school (research sites) has two participating teachers, one male and one female. All teacher participants represent the “White” racial group. Content area refers to the courses in which students who participated in the study are enrolled. The courses are basic or “core” level courses which students are required to take to earn credit in order to qualify for a high school diploma.

Table 3

Student Participants by Gender (N = 79)

| <i>Gender</i> | <i>Teacher 1</i> | <i>Teacher 2</i> | <i>Teacher 3</i> | <i>Teacher 4</i> | <i>Total</i> |
|---------------|------------------|------------------|------------------|------------------|--------------|
| Male | 12 | 13 | 10 | 8 | 43 |
| Female | 6 | 12 | 8 | 10 | 36 |

Male participants $n = 43$ (54%) and student female participants $n = 36$ (46%) represent a relatively even distribution with the exception of Teacher 1. Racially, the study is one-dimensional with $n = 73$ (93%) representing the “White” racial group, $n = 5$ (6%) representing the Hispanic racial group, and $n = 1$ (1%) representing the Asian racial group. There were no participants who reported their racial/ethnic identity to be “Black,” “American Indian,” or “Alaskan.”

Table 4

Student Participants by Grade Level (N = 79)

| <i>Grade Level</i> | <i>Teacher 1</i> | <i>Teacher 2</i> | <i>Teacher 3</i> | <i>Teacher 4</i> | <i>Total</i> |
|--------------------|------------------|------------------|------------------|------------------|--------------|
| 9 | - | - | 9 | - | 9 |
| 10 | 16 | - | 8 | 18 | 42 |
| 11 | 2 | 25 | - | - | 27 |
| 12 | - | - | 1 | - | 1 |

Student participants include $n = 42$ (53%) representing grade 10 and $n = 27$ (34%) representing grade 11, followed by $n = 9$ (11%) in grade 9 and $n = 1$ (1%) in grade 12. As previously stated, the courses selected for this study were basic or “core” level classes required for graduation, therefore naturally targeted grades 10 and 11.

Descriptive Statistical Results

Table 5 shows the total number of TM interventions ($N = 474$) sent to parents and students ($N = 79$ for each group) from teachers ($N = 4$). TM intervention B does not require parents to receive a text message. TM intervention C does not require students to receive a text message. Appendices R, S, T, and U provide the specific content of each TM intervention and its placement on the Latin square matrix.

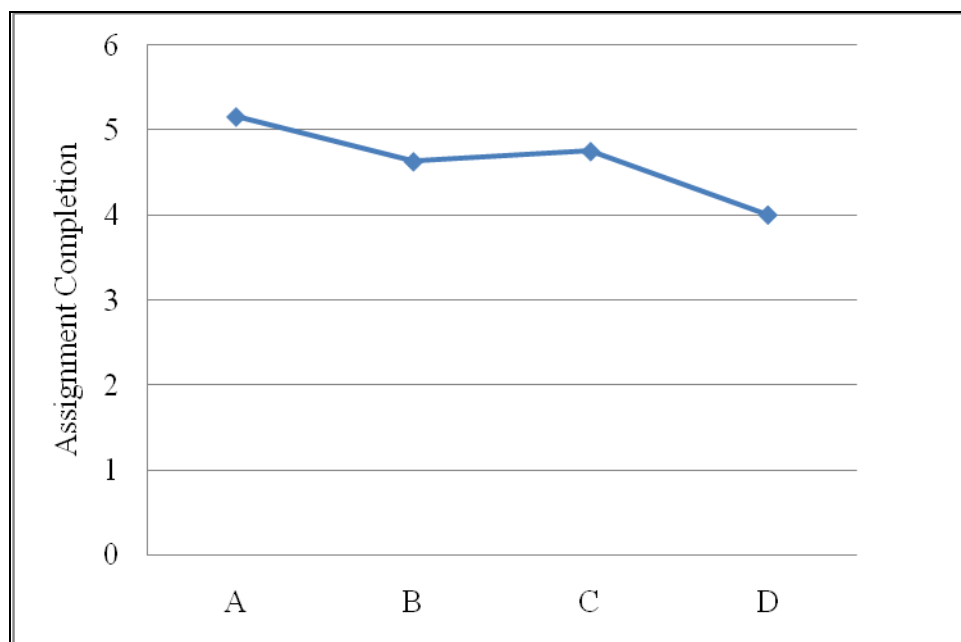
Table 5

Total Number of TM Interventions Sent to Student and Parent Participants ($N = 474$)

| <i>Teacher</i> | <i>Total TM Interventions</i> | <i>To Parents by TM Intervention Type</i> | | | | <i>To Students by TM Intervention Type</i> | | | |
|----------------|-------------------------------|---|---|----|----|--|----|---|----|
| | | A | B | C | D | A | B | C | D |
| 1 | 108 | 18 | - | 18 | 18 | 18 | 18 | - | 18 |
| 2 | 150 | 25 | - | 25 | 25 | 25 | 25 | - | 25 |
| 3 | 108 | 18 | - | 18 | 18 | 18 | 18 | - | 18 |
| 4 | 108 | 18 | - | 18 | 18 | 18 | 18 | - | 18 |
| Total | 474 | 79 | | 79 | 79 | 79 | 79 | | 79 |

Figure 4.0

Student Assignment Completion Means for All Intervention Types



Note. 6.0 M = 100% assignment completion.

Table 6

Summative Means for TM Interventions A, B, C, D

| <i>Intervention</i> | <i>A</i> | <i>B</i> | <i>C</i> | <i>D</i> |
|---------------------|----------|----------|----------|----------|
| <i>M</i> | 5.16 | 4.63 | 4.75 | 4 |
| <i>N</i> | 79 | 79 | 79 | 79 |
| <i>SD</i> | 1.41 | 1.34 | 1.36 | 1.41 |

Note. 6.0 M = 100% assignment completion. A = specific assignment TM to parents and students, B = specific assignment TM to students, C = specific assignment TM to parents, and D = non specific assignment TM to students and parents.

Figure 4.0 and Table 6 show comprehensive assignment completion means data for TM interventions A, B, C, and D collected by Teachers 1, 2, 3, and 4. Student participation ($N = 79$) is accompanied by parent participation ($N = 79$).

Each teacher participant ($N = 4$) sent six text messages to each participating student and parent (in accordance with TM intervention requirements) for each intervention type (6 x A, 6 x B, 6 x C, 6 x D = 24 TM interventions). The data shows TM intervention A (5.16) with the highest mean score, followed by TM intervention C (4.75), TM intervention B (4.63), and TM intervention D (4.0).

Table 7

TM Intervention A and D Comparison

| <i>Significant Difference Between TM Intervention A and D</i> | | | |
|---|----------|-----------|----------|
| TM Intervention | <i>M</i> | <i>SD</i> | <i>N</i> |
| A | 5.16 | 1.41 | 79 |
| D | 4.0 | 1.41 | 79 |

Note. 6.0 M = 100% assignment completion.

TM interventions A (text message to parents and students about a specific homework assignment) and D (text message to parents and students about a non specific homework assignment) represent the most significant difference in assignment completion means. Table 7 provides a summary of assignment completion mean and standard deviation scores of student participants ($N = 79$) for TM intervention A (5.16) and TM intervention D (4.0). TM interventions A and D have a standard deviation score of 1.41.

Research Question 1

Is there a significant difference in student assignment completion rate if students receive text messages on their mobile phones regarding class assignments? The following findings are examined in the context of TM intervention B, which requires the text message to be sent to students only--the requirement for research question 1.

Table 8

TM Intervention B Individual Teacher Findings

| <i>Teacher</i> | <i>Intervention</i> | <i>Intervention Applied</i> | <i>SD</i> | <i>M</i> | <i>N</i> |
|----------------|---------------------|-----------------------------|-----------|----------|----------|
| 1 | B | Weeks 4-6 | 0.75 | 5.11 | 18 |
| 2 | B | Weeks 1-3 | 1.18 | 4.86 | 25 |
| 3 | B | Weeks 10-12 | 0.87 | 5.22 | 18 |
| 4 | B | Weeks 7-9 | 1.72 | 3.5 | 18 |

Note. 6.0 *M* = 100% assignment completion.

Table 8 shows Teachers 1, 2, and 3 having similar means and *SD* scores while Teacher 4 having considerable differences in both mean and *SD* scores. The order of application for TM intervention B is random, as dictated by the Latin square matrix (Figure 3.4). The data results of Teacher 4 indicate several possible conclusions. The data suggests that the micro-culture, such as motivation levels, GPA, technology use, of student participants for Teacher 4 is less responsive to the use of mobile technology as a way to communicate. For Teachers 1, 2, and 3 the comparable means and *SD* scores provide a sense of assurance that TM intervention B leads to similar results.

TM Intervention B Effects by Gender, Grade level, and Ethnicity

Variables such as grade level, gender, and ethnicity need to be examined in order to fully understand the effects of TM intervention B (as it relates to research question 1). Student participants ($N = 79$) composed of male ($n = 43$) and female ($n = 36$) students allowed for valid comparison on gender.

Table 9

TM Intervention B Gender Findings

| <i>Gender</i> | <i>Intervention B</i> |
|---------------|-----------------------|
| Male M | 4.51 |
| <i>N</i> | 43 |
| <i>SD</i> | 1.43 |
| Female M | 4.77 |
| <i>N</i> | 36 |
| <i>SD</i> | 1.22 |

Note. 6.0 M = 100% assignment completion.

By examining the mean, Table 9 provides evidence that female student participants had slightly higher assignment completion mean scores (4.77) for TM intervention B compared to male students (4.51). These findings lead to the belief that female students respond more positively compared to males if the text message is delivered to the student only. The *SD* scores provide an in depth look into the consistency of student response to TM intervention B. The *SD* scores tells us there is considerable disagreement with students' responses (by gender) to TM intervention B. This simply indicates a wide disparity or range of possible responses to TM intervention B. Due to the inconsistency, as determined by the

SD scores, it is difficult to support the findings that show female students responded more positively that make student to TM intervention B.

Table 10

TM Intervention B Student Grade Level Findings

| <i>Grade</i> | | <i>Intervention B</i> |
|--------------|-----------|-----------------------|
| 9 | <i>M</i> | 5.22 |
| | <i>N</i> | 9 |
| | <i>SD</i> | 0.83 |
| 10 | <i>M</i> | 4.45 |
| | <i>N</i> | 42 |
| | <i>SD</i> | 1.51 |
| 11 | <i>M</i> | 4.66 |
| | <i>N</i> | 27 |
| | <i>SD</i> | 1.14 |

Note. 6.0 *M* = 100% assignment completion. Grade 12 participant ($n = 1$) not included in the table.

Table 10 indicates that the majority of student participants are in grade 10 ($n = 42$) and grade 11 ($n = 27$), followed by a significantly lower number of student participants in grade 9 ($n = 9$). Although grade 9 reflects higher mean assignment completion scores, the number of student participants in grade 9 does constitute an equitable comparison. The focus of the findings rest with grades 10 and 11 which have similar mean score results.

Table 11

TM Intervention B Ethnicity Findings

| <i>Ethnicity</i> | | <i>B</i> |
|------------------|-----------|----------|
| Hispanic | <i>M</i> | 3.40 |
| | <i>N</i> | 5 |
| | <i>SD</i> | 1.94 |
| Caucasian | <i>M</i> | 4.70 |
| | <i>N</i> | 73 |
| | <i>SD</i> | 1.26 |

Note. 6.0 *M* = 100% assignment completion. Asian student participant ($n = 1$) not included on table.

The classes selected for this study represent standard core level academic subject areas required by students to complete in order to earn a high school diploma. Although the intent was to capture a diverse ethnic student population, the result is a fairly one-dimensional study with Caucasian students ($n = 73$) making up the majority of student participants, followed by Hispanics ($n = 5$). The demographic profiles of research site 1 and 2 (Table 1) provide information showing Caucasians comprising most of the student body at each site. Due to the ethnic one-dimensional nature of this study, and ethnic comparison of findings did not occur. The SD score of 1.26 for TM intervention B provides reasonable evidence of student response inconsistencies. Although the one-dimensional nature of this study limits the findings of Hispanic or Asian students, it allows for a solid and consistent finding in regards to the effect of TM intervention B on Caucasian student participants.

In summary, research question 1 asks if there is a significant difference in student assignment completion if only the student receives the TM intervention. In order to answer this research question, a comparison of TM interventions is required. Table 6 provides evidence that TM intervention B is more effective than TM intervention D but less effective than TM interventions A and C. The *SD* score of 1.26 for TM intervention B provides evidence of mild inconsistencies in student response compared to TM interventions A, B, and C. Therefore, text messages sent directly to students from teachers that contain specific assignment information have a positive impact on student assignment completion.

Research Question 2

Is there a significant difference in student assignment completion rate if parents receive text messages on their cell phones regarding class assignments? This research question calls for an examination of the findings for TM intervention C, which requires the text message to be sent only to parents.

Table 12

TM Intervention C Individual Teacher Findings

| <i>Teacher</i> | <i>Intervention</i> | <i>Intervention Applied</i> | <i>SD</i> | <i>M</i> | <i>N</i> |
|----------------|---------------------|-----------------------------|-----------|----------|----------|
| 1 | C | Weeks 7-9 | .70 | 5.55 | 18 |
| 2 | C | Weeks 10-12 | .91 | 5.0 | 25 |
| 3 | C | Weeks 1-3 | .96 | 5.11 | 18 |
| 4 | C | Weeks 4-6 | 1.63 | 3.27 | 18 |

Note. 6.0 *M* = 100% assignment completion.

Table 12 indicates Teachers 1, 2, and 3 having similar means and *SD* scores for TM intervention C while Teacher 4 shows a significant difference in both mean and *SD* scores. Teacher 4's *SD* score of 1.63 is starkly different compared to Teacher 1's *SD* score of .70, Teacher 2's *SD* score of .91, and Teacher 3's *SD* score of .96. These findings indicate fairly strong homogeneity for Teachers 1, 2, and 3 in regards to consistent parent response to TM intervention C. Teacher 4 findings demonstrate clear inconsistencies in parent response.

TM Intervention C Effects by Gender, Grade Level, and Ethnicity

Research question 2 calls for an examination of the findings related to TM intervention C. The following findings allow for an exploration TM intervention C's effect on student assignment completion rates when considering the student's gender, grade level, and ethnicity.

Table 13

TM Intervention C Gender Findings

| <i>Gender</i> | <i>Intervention C</i> |
|------------------|-----------------------|
| Male <i>M</i> | 4.65 |
| <i>N</i> | 43 |
| <i>SD</i> | 1.46 |
| Females <i>M</i> | 4.88 |
| <i>N</i> | 36 |
| <i>SD</i> | 1.23 |

Note. 6.0 *M* = 100% assignment completion.

Table 13 provides findings that show female students ($n = 36$) participants had a slightly higher assignment completion mean score of 4.88 for TM

intervention C compared to a 4.65 score for male students ($n = 43$). Again, a 6.0 mean score is equivalent to 100% assignment completion. The participant population size ($N = 79$) provides a solid foundation for reasonable conclusions to be made.

Male students have *SD* score of 1.46 while female students have a *SD* score of 1.23. Inconsistencies are clear, both with male and female students in response to TM intervention C. Although, findings perhaps suggest that the large range of inconsistencies are a result of the intervention type, which call for parents only to receive the text message notification.

Table 14

TM Intervention C Student Grade Level Findings

| <i>Grade</i> | | <i>Intervention C</i> |
|--------------|-----------|-----------------------|
| 9 | <i>M</i> | 4.88 |
| | <i>N</i> | 9 |
| | <i>SD</i> | 1.16 |
| 10 | <i>M</i> | 4.54 |
| | <i>N</i> | 42 |
| | <i>SD</i> | 1.62 |
| 11 | <i>M</i> | 5.03 |
| | <i>N</i> | 27 |
| | <i>SD</i> | 0.89 |

Note. 6.0 *M* = 100% assignment completion. Grade 12 ($n = 1$) not included in table.

Table 14 shows grade 10 ($n = 42$) and grade 11 ($n = 27$) students making up the majority of student participants. Grade 9 ($n = 9$) does not provide a large

enough sample population to verify findings. Using TM Intervention C, grade 11 has the highest mean score of 5.03, followed by grade 9 with 4.88, and grade 10 with 4.54. By focusing on grades 11 and 10, reasonably solid findings can be validated due to participant populations.

The *SD* score for Grade 11 is .89 providing evidence of student response consistency for TM intervention C. Grade 10 *SD* score is 1.62. From these findings, it is clear major inconsistencies exist in grade 10 student responses to TM intervention C. The validity of these findings is further justified for grade 10 due to the high number of student participants ($n = 42$).

Table 15

TM Intervention C Ethnicity Findings

| <i>Ethnicity</i> | | <i>Intervention C</i> |
|------------------|-----------|-----------------------|
| Asian | <i>M</i> | 5 |
| | <i>N</i> | 1 |
| | <i>SD</i> | - |
| Hispanic | <i>M</i> | 3.80 |
| | <i>N</i> | 5 |
| | <i>SD</i> | 1.48 |
| Caucasian | <i>M</i> | 4.82 |
| | <i>N</i> | 73 |
| | <i>SD</i> | 1.34 |

Note. 6.0 *M* = 100% assignment completion.

As previously stated, this is a one-dimensional ethnic study as a result of Caucasians making up a majority of the student participations ($n = 73$). Therefore,

examination of Caucasian responses to TM intervention C provides the most reliable findings. Table 15 displays a mean score of 4.82 with a *SD* score of 1.34 resulting student response inconsistencies to TM intervention C.

In summary, research question 2 asks if there is a significant difference in student assignment completion if only the parents receive the TM intervention. Again, referring to Table 6 provides evidence that TM intervention C is more effective than TM interventions B and D but less effective than TM intervention A. Although, with an *SD* score of 1.34, TM intervention C reflects a high range of possible student response inconsistencies. Text messages sent directly to parents from teachers that contain specific assignment information have a positive impact on student assignment completion. It is evident that the TM interventions that require the parent to receive specific assignment information result in more positive assignment completion rates.

Research Question 3

Is there a significant difference in student assignment completion rate if both parents and students receive text messages on their cell phones regarding class assignments? This research question calls for an examination of the findings for TM interventions A and D, which require the text message to be sent to students and parents.

Table 16

TM Intervention A and D Individual Teacher Findings

| <i>Teacher</i> | <i>Intervention</i> | <i>Intervention Applied</i> | <i>SD</i> | <i>M</i> | <i>N</i> |
|----------------|---------------------|-----------------------------|-----------|----------|----------|
| 1 | A | Weeks 1-3 | .38 | 5.83 | 18 |
| 2 | A | Weeks 7-9 | .80 | 5.24 | 25 |
| 3 | A | Weeks 4-6 | .78 | 5.44 | 18 |
| 4 | A | Weeks 10-12 | 2.37 | 4.11 | 18 |
| 1 | D | Weeks 10-12 | 1.39 | 3.94 | 18 |
| 2 | D | Weeks 4-6 | .86 | 3.64 | 25 |
| 3 | D | Weeks 7-9 | 1.39 | 4.77 | 18 |
| 4 | D | Weeks 1-3 | 1.83 | 3.77 | 18 |

Note. 6.0 *M* = 100% assignment completion.

Reviewing the findings for TM interventions A and D reveals a variation in student and parent response to the interventions. By comparing TM intervention A and D, findings indicate that when both parents and students receive a text message notification with specific content related to an assignment, mean scores for assignment completion are significantly higher. Table 16 demonstrates a comparison of TM interventions A and D for all teacher participants and intervention timeframes.

Table 17

TM Interventions A and D with Mean Differences

| <i>Teacher</i> | <i>Intervention</i> <i>A</i> | <i>SD</i> | <i>Intervention</i> <i>D</i> | <i>SD</i> | <i>N</i> | <i>M Difference</i> |
|----------------|---------------------------------|-----------|---------------------------------|-----------|----------|---------------------|
| 1 | 5.83 | .38 | 3.94 | 1.39 | 18 | 1.89 |
| 2 | 5.24 | .80 | 3.64 | .86 | 25 | 1.60 |
| 3 | 5.44 | .78 | 4.77 | 1.39 | 18 | .67 |
| 4 | 4.11 | 2.37 | 3.77 | 1.83 | 18 | .34 |
| Total | 5.15 | 1.08 | 4.03 | 1.36 | 79 | 1.12 |

Note. 6.0 *M* = 100% assignment completion.

Table 17 provides a mean score comparison of TM intervention A and D with overall differences. Teacher 1 shows TM intervention A having a higher mean score of assignment completion compared to TM intervention D, with a difference of 1.89, followed by Teacher 2 with a difference of 1.60, Teacher 3 with a difference of 0.67, and followed by Teacher 4 with a difference of 0.34. Teacher 4 has significant differences in TM intervention A and D mean and *SD* scores, thus resulting in a direct impact on the findings. The mean score difference (0.34) for Teacher 4 shows no major difference between TM interventions A and D. Although, when evaluating the *SD* scores for Teacher 4, inconsistencies in student response are evident. For TM intervention A, Teacher 4 has a *SD* score of 2.37 compared to a *SD* score of 1.83.

A logical conclusion can be made in reference to research question 3 in regards to TM interventions A and D by comparing the mean score and *SD* totals as identified in Table 17. TM intervention A has a mean score of 5.15 and a *SD*

score of 1.08. TM intervention D has a mean score of 4.03 and a *SD* score of 1.36. Although TM intervention A demonstrates a higher numerical mean score, a deeper look into the findings show parent and student response to the intervention consistent for Teachers 1, 2 and 3. For Teacher 4, major inconsistencies are apparent as indicated by the wide range of *SD* scores. For all teacher participants, TM intervention D has a lower mean numerical score and shows a wide disparity in *SD* scores. The wide disparities in *SD* scores are consistent, therefore demonstrating no consistencies in how student and parent participants respond to TM intervention D.

TM Interventions A and D Effect by Gender, Grade Level, and Ethnicity

Examining student and participant variables as they relate to research question 3 provides a more holistic view of the findings. The following findings allow for the exploration of TM interventions A and D's effects on student assignment completion rates when considering a student's gender, grade, and ethnicity. Table 18 provides findings that show female student participants ($n = 36$) with a higher mean assignment completion score of 5.36 for TM intervention A and 4.16 for TM intervention D compared to males who have a 5.0 assignment completion mean for TM intervention A and a 3.86 completion mean for TM intervention D. The findings consistently show a more positive response to TM intervention A, which calls for the content of the text message to be related to a specific assignment rather than to the general-non specific text message called for by TM intervention D.

Table 18

TM Intervention A and D Gender Findings

| <i>Gender</i> | <i>Intervention A</i> | <i>Intervention D</i> |
|------------------|-----------------------|-----------------------|
| Male <i>M</i> | 5 | 3.86 |
| <i>N</i> | 43 | 43 |
| <i>SD</i> | 1.46 | 1.52 |
| Females <i>M</i> | 5.36 | 4.16 |
| <i>N</i> | 36 | 36 |
| <i>SD</i> | 1.35 | 1.27 |

Note. 6.0 *M* = 100% assignment completion.

The male and female *SD* scores for TM interventions A and D provide insight into the consistency of response. For males who received TM intervention A, the *SD* score is 1.46 a reasonably high score. For males who received TM intervention D, the *SD* score is 1.52, which reflects an even higher range of possible responses. For females who received TM intervention A, the *SD* score is 1.35 followed by a *SD* score of 1.27 for TM intervention D. Not only do females have a higher numerical average for assignment completion, but their *SD* scores have less disparity than their male counterparts showing consistency in regards to female response to TM interventions A and D.

Table 19

TM Interventions A and D Student Grade Level Findings

| <i>Grade</i> | | <i>Intervention A</i> | <i>Intervention D</i> |
|--------------|-----------|-----------------------|-----------------------|
| 9 | <i>M</i> | 5.33 | 4.55 |
| | <i>N</i> | 9 | 9 |
| | <i>SD</i> | 1 | 1.58 |
| 10 | <i>M</i> | 5.02 | 4.02 |
| | <i>N</i> | 42 | 42 |
| | <i>SD</i> | 1.75 | 1.61 |
| 11 | <i>M</i> | 5.29 | 3.70 |
| | <i>N</i> | 27 | 27 |
| | <i>SD</i> | 0.86 | 0.86 |

Note. 6.0 *M* = 100% assignment completion. Grade 12 student participant ($n = 1$) is not included in table.

As the findings in Table 19 indicate, the majority of student participants are in grade 10 ($n = 42$) and 11 ($n = 27$) thus allowing for a focused comparison of Grade 10 and 11. Grade 9 ($n = 9$) findings provide minimal comparison validity due to low number of participants. For grade 11, the mean assignment completion score for TM intervention A (5.29) is significantly higher compared to TM intervention D (3.70). This reflects a significant difference in grade 11 response to TM interventions A and D. The grade 11 *SD* scores for TM intervention A and D is .86. The low *SD* scores indicate consistent student responses to TM interventions A and D. Grade 10 findings are similar, showing TM intervention A having a higher mean assignment score (5.02) compared to

TM intervention D (4.02). Although, differences between grade 10 and 11 emerge when examining the *SD* scores of grade 10. The grade 10 *SD* score for TM intervention A is 1.75. Grade 10 *SD* score for TM intervention D is 1.61.

Therefore, it is clear that inconsistencies exist in grade 10 student responses.

Table 20

TM Intervention A and D Ethnicity Findings

| <i>Ethnicity</i> | | <i>Intervention A</i> | <i>Intervention D</i> |
|------------------|-----------|-----------------------|-----------------------|
| Hispanic | <i>M</i> | 3.60 | 2.80 |
| | <i>N</i> | 5 | 5 |
| | <i>SD</i> | 2.51 | 1.48 |
| Caucasian | <i>M</i> | 5.29 | 4.08 |
| | <i>N</i> | 73 | 73 |
| | <i>SD</i> | 1.27 | 1.39 |

Note. 6.0 *M* = 100% assignment completion. Asian student participant ($n = 1$) not included in table.

Ethnicity, as it relates to participants in this study, plays a minimal role in the findings. Table 20 provides clear evidence of Caucasians making up the majority of student participants ($N = 73$). When comparing Caucasian student participant findings of TM interventions A and D, significant differences emerge. TM intervention A displays a mean score of 5.29 with a *SD* score of 1.27. TM intervention D displays a mean score of 4.08 with a *SD* score of 1.39. Although the mean numerical score of 5.29 for TM intervention A suggests a positive student response, a wide range of student responses as indicated by the *SD* score shows major inconsistencies in student responses. TM intervention D reflects

comparable findings with even more considerable inconsistencies of individual student responses.

In summary, research question 3 asks if there is a significant difference in student assignment completion if both the parent and student receive a TM intervention. The use of TM interventions A and D, in alignment with research question 3, provides evidence of a sharp contrast between TM intervention A, which requires specific text messages to reflect specific assignment content, and TM intervention D, which requires nonspecific content. Table 6 provides evidence that TM intervention A has a higher assignment completion mean completion average compared to TM intervention B, C, or D. Although, when comparing the *SD* ranges for TM intervention A and D, some striking differences emerge. TM intervention A has the highest assignment completion mean but also has the highest *SD* score of 1.41 signaling a high disparity in student response. TM intervention D has the lowest assignment completion mean coupled with a high *SD* score of 1.41. Needless to say, evidence suggests text messages sent directly to students and parents that contain specific assignment information have the most positive impact on student assignment completion.

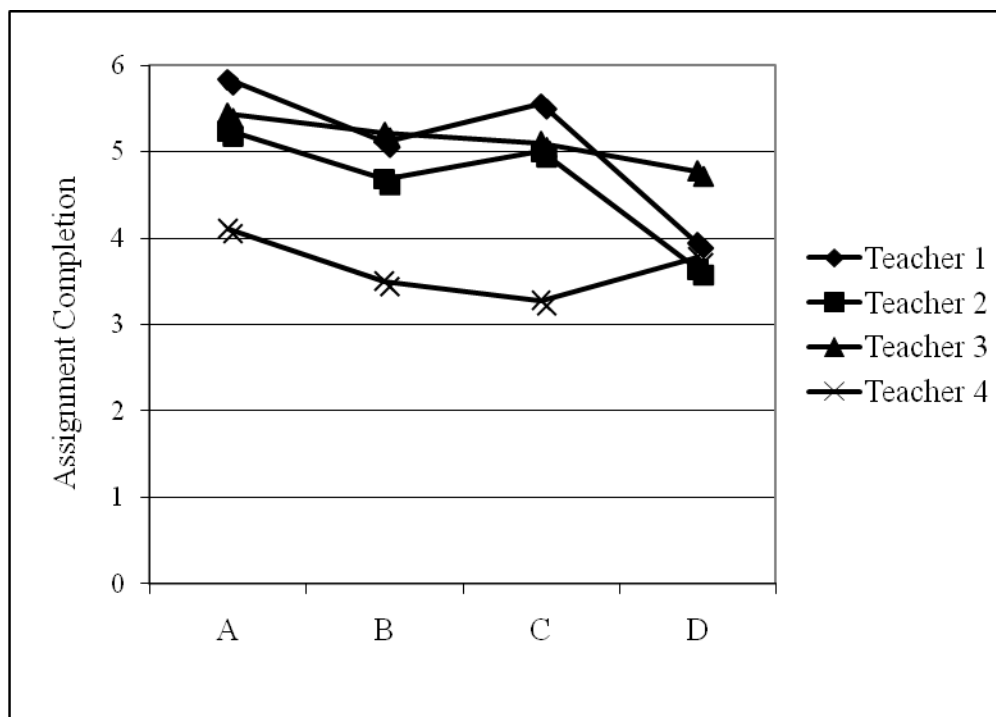
TM Intervention Impacts by Teacher, Grade Level, and Gender

Additional descriptive statistical findings must be fully evaluated in order to examine the relationship between the results of this study and each research question. In order to get a comprehensive understanding, individual teacher,

gender, grade level, and ethnicity of student participants is evaluated in relationship to each TM intervention.

Figure 4.1

TM Intervention Mean for Each Teacher Participant



Note. 6.0 M = 100% assignment completion.

Figure 4.1 compares assignment completion rate for the individual teacher participant ($N = 4$) with TM interventions A, B, C, and D. Teachers 1 (5.10), 2 (4.69), and 3 (5.13) have similar cumulative assignment completion rates with TM intervention A resulting in the highest mean completion scores. The results for Teacher 4 (3.66) reflect unique trends compared to Teachers 1, 2, and 3 with an overall lower student assignment completion rate and an upward trend in assignment completion for TM intervention D.

Table 21

Latin Square Matrix of Student Assignment Completion Means with Corresponding Standard Deviations

| | <i>Teacher 1</i> | <i>Teacher 2</i> | <i>Teacher 3</i> | <i>Teacher 4</i> |
|----------|------------------|------------------|------------------|------------------|
| Semester | A | B | C | D |
| Weeks | $M = 5.83\%$ | $M = 4.86\%$ | $M = 5.11\%$ | $M = 3.77\%$ |
| 1-3 | $SD = 0.38$ | $SD = 1.18$ | $SD = 0.96$ | $SD = 1.83$ |
| | $n = 18$ | $n = 25$ | $n = 18$ | $n = 18$ |
| Semester | B | D | A | C |
| Weeks | $M = 5.11\%$ | $M = 3.64\%$ | $M = 5.44\%$ | $M = 3.27\%$ |
| 4-6 | $SD = 0.75$ | $SD = 0.86$ | $SD = 0.78$ | $SD = 1.63$ |
| | $n = 18$ | $n = 25$ | $n = 18$ | $n = 18$ |
| Semester | C | A | D | B |
| Weeks | $M = 5.55\%$ | $M = 5.24\%$ | $M = 4.77\%$ | $M = 3.5\%$ |
| 7-9 | $SD = 0.70$ | $SD = 0.80$ | $SD = 1.39$ | $SD = 1.72$ |
| | $n = 18$ | $n = 25$ | $n = 18$ | $n = 18$ |
| Semester | D | C | B | A |
| Weeks | $M = 3.94\%$ | $M = 5.0\%$ | $M = 5.22\%$ | $M = 4.11\%$ |
| 10-12 | $SD = 1.39$ | $SD = 0.91$ | $SD = 0.87$ | $SD = 2.37$ |
| | $n = 18$ | $n = 25$ | $n = 18$ | $n = 18$ |

Note. 6.0 $M = 100\%$ assignment completion.

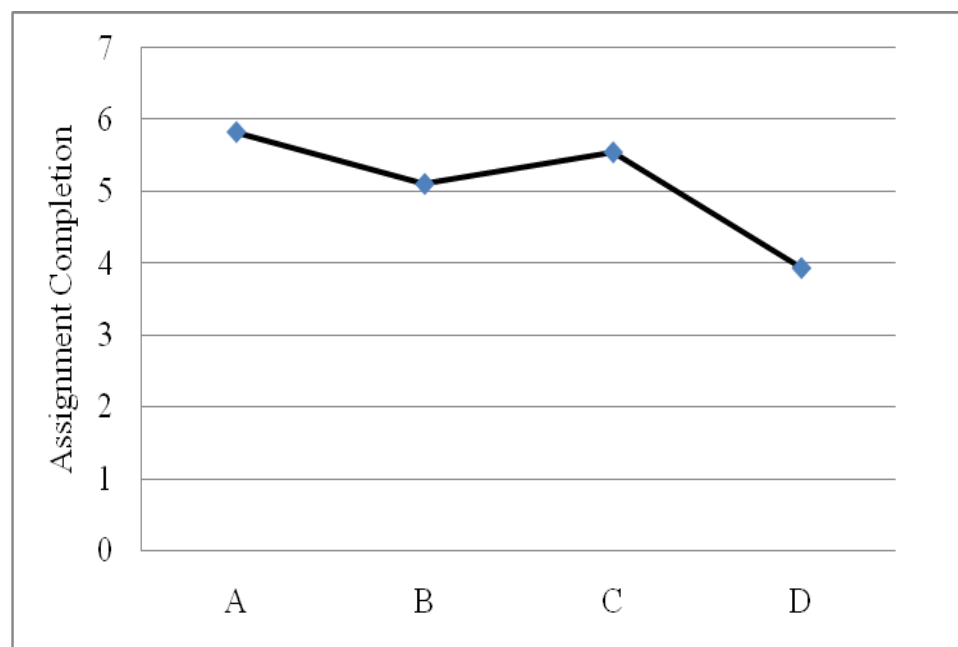
The Latin-square matrix represented in Table 21 provides means for TM interventions A, B, C, and D, teacher participants ($N = 4$), and four semester week sessions. Each semester week session is three calendar weeks in length. Total

student participants resulted in Teacher 1 having $n = 18$ students, followed by Teacher 2 having $n = 25$ students, Teacher 3 having $n = 18$ participants, and Teacher 4 having $n = 18$ students. Teacher 1 has the highest mean assignment completion rate of 5.83 using TM intervention A followed by TM intervention C with a completion rate of 5.55. Each teacher participant has a unique set of influences (e.g. class size, content area, grade level, and instructional method) thus affecting the intervention outcomes. Summarizing the data results by individual teacher provides a basis of comparison in order to come to conclusions based on valid interpretations.

Teacher 1

Figure 4.2

Teacher 1 Student Assignment Completion Mean



Note. 6.0 M = 100% assignment completion.

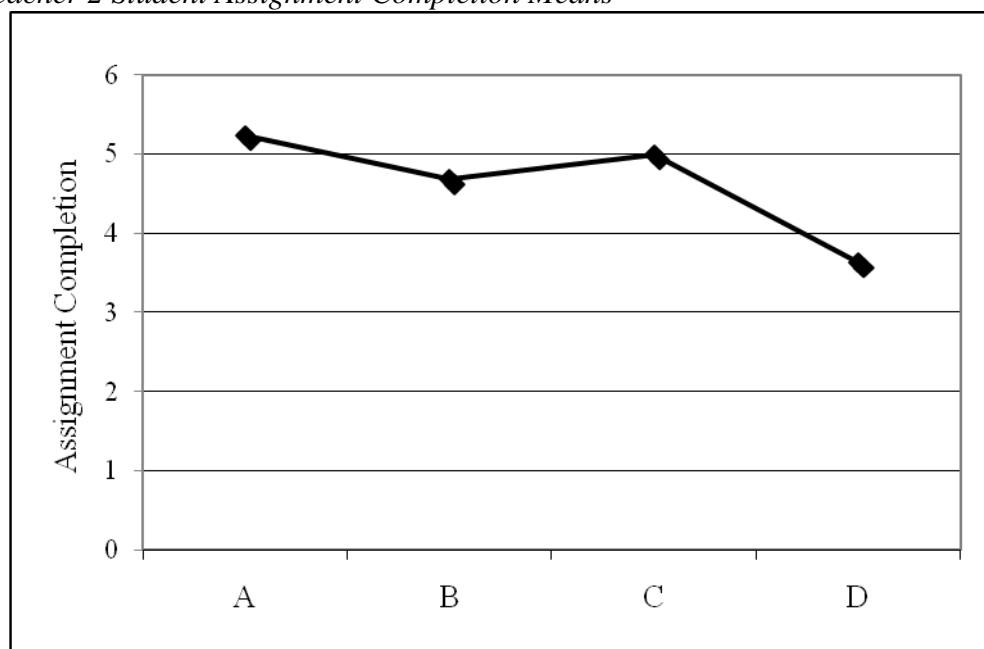
Figure 4.2 shows descriptive statistical data for Teacher 1 (site 1) assignment completion using TM interventions A, B, C, and D in a grade 10

regular level biology science class. Student participants include 12 males and 6 females ($n = 18$), accompanied by $n = 18$ parents in order to meet the requirements for interventions A, C, and D. Teacher 1 sent six text messages to each participating student (and parent if applicable) for each intervention type (6 x A, 6 x B, 6 x C, 6 x D = 24 total TM interventions). TM intervention A (5.83) has the highest mean score, followed by TM intervention C (5.55), TM intervention B (5.11) and TM intervention D (3.94).

Teacher 2

Figure 4.3

Teacher 2 Student Assignment Completion Means



Note. 6.0 M = 100% assignment completion.

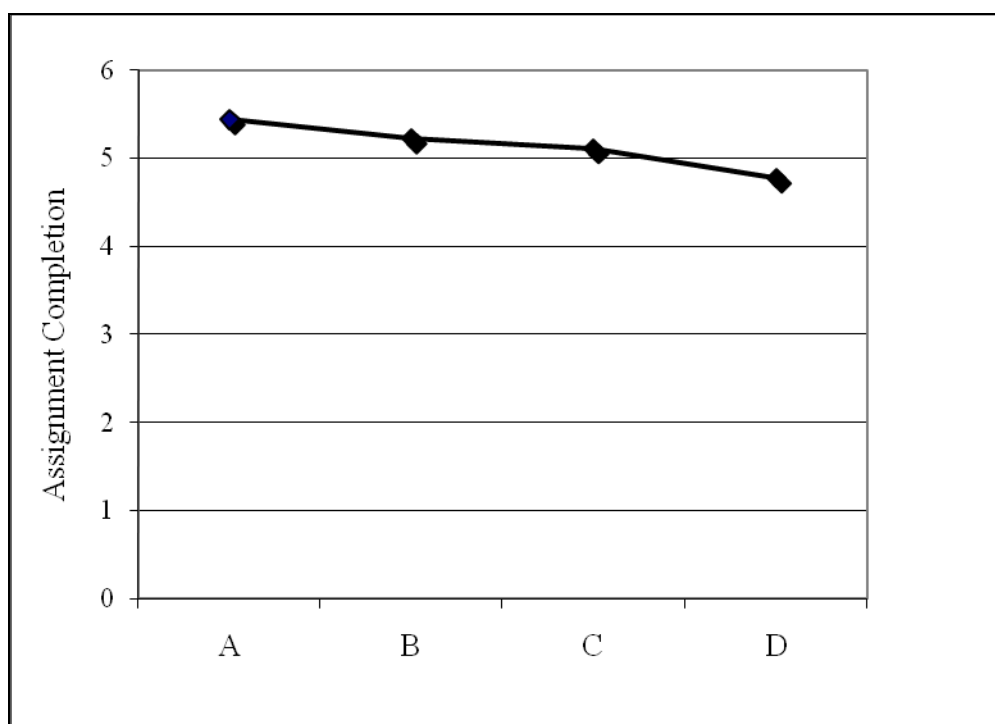
Figure 4.3 shows descriptive statistical data for Teacher 2 (site 2) assignment completion using TM interventions A, B, C, and D in a grade 11 regular level United States history class. Student participants include 13 males and 12 females ($n = 25$), accompanied by parents ($n = 25$) in order to meet the requirements for TM interventions A, C, and D. Teacher 2 sent six text messages

to each participating student (and parents if applicable) for each TM intervention type (6 x A, 6 x B, 6 x C, 6 x D = 24 total interventions). TM intervention A (5.24) has the highest mean score, followed by TM intervention C (5.0), TM intervention B (4.68) and TM intervention D (3.94). The SD for TM interventions A (0.87), C (0.91), D (0.86) fall within similar ranges with TM intervention B (1.18) having the greatest difference.

Teacher 3

Figure 4.4

Teacher 3 Student Assignment Completion by Mean



Note. 6.0 M = 100% assignment completion rate.

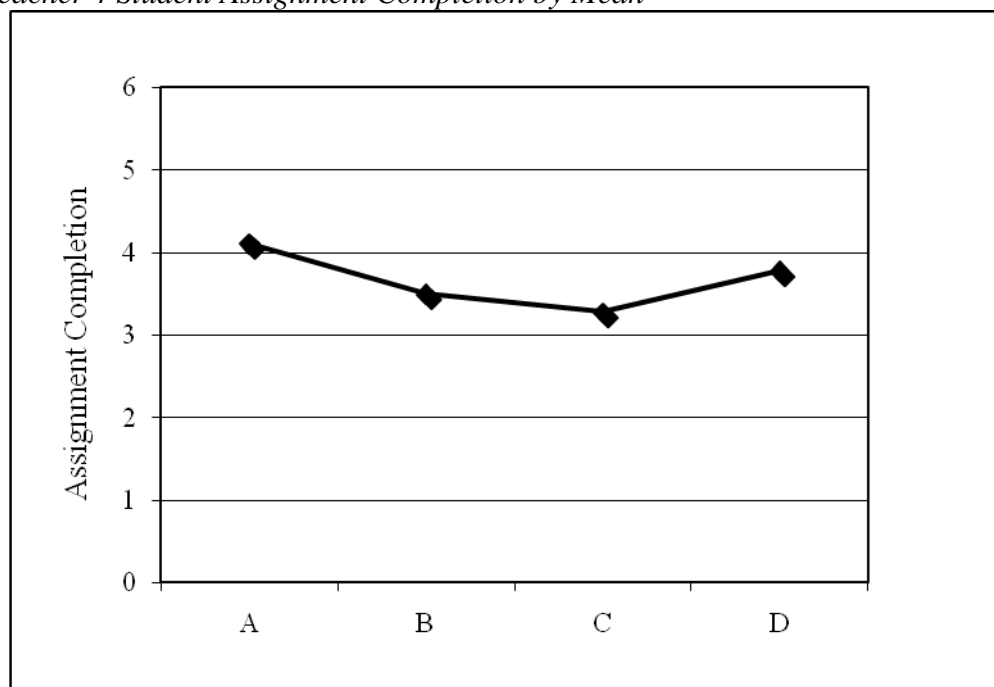
Figure 4.4 shows descriptive statistical data for Teacher 3 (site 2) assignment completion using TM interventions A, B, C, and D in a grade 10 and 11 regular level Algebra I class. Student participants include 10 males and 8 females ($n = 18$), accompanied by parents ($n = 18$) in order to meet the

requirements for TM interventions A, C, and D. Teacher 3 sent six text messages to each participating student (and parents if applicable) for each TM intervention type (6 x A, 6 x B, 6 x C, 6 x D = 24 total interventions). Table 11 summarizes the data results for Teacher 3. TM intervention A (5.44) has the highest mean score, followed by TM intervention B (5.22), TM intervention C (5.11) and TM intervention D (4.77). The *SD* for TM interventions A (0.78), B (0.87), and C (0.96) fall within similar ranges, with TM intervention D (1.39) having the greatest difference.

Teacher 4

Figure 4.5

Teacher 4 Student Assignment Completion by Mean



Note. 6.0 *M* = 100% assignment completion.

Figure 4.5 shows descriptive statistical data for Teacher 4 (site 1) assignment completion using TM interventions A, B, C, and D in a grade 11 regular level United States History class. Student participants include 8 males

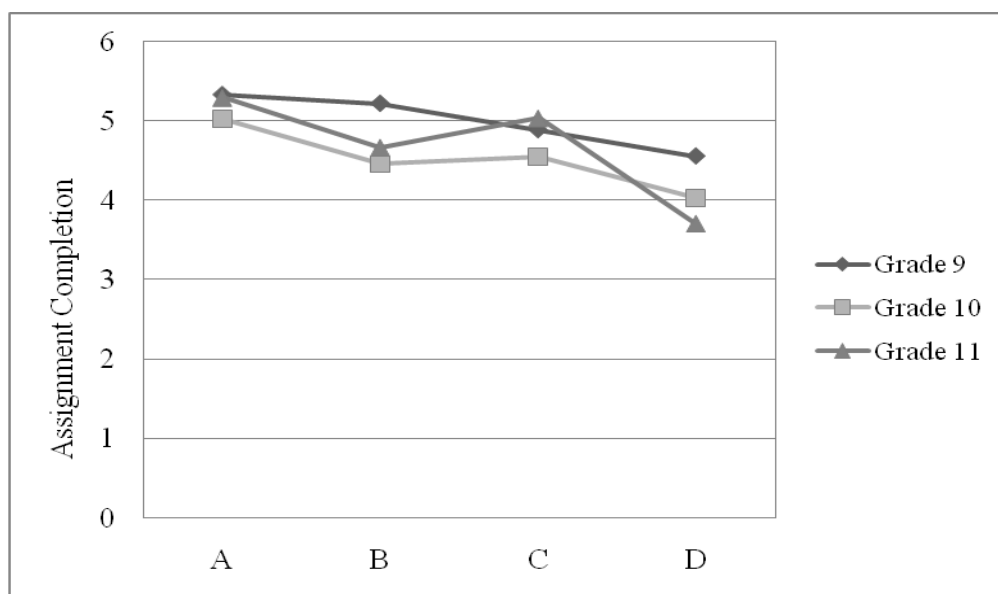
and 10 females ($n = 18$), accompanied by parents ($n = 18$) in order to meet the requirements for TM interventions A, C, and D. Teacher 4 sent six text messages to each participating student (and parent if applicable) for each TM intervention type (6 x A, 6 x B, 6 x C, 6 x D = 24 total interventions). TM intervention A (4.11) has the highest mean score, followed by TM intervention D (3.77), TM intervention B (3.50) and TM intervention C (3.27). The *SD* for TM interventions B (1.72), C (1.63), D (1.83) fall within similar ranges with TM intervention A (2.37) having the greatest difference.

The student participants in this study reflect a majority of Caucasian students ($n = 73$) followed by Hispanic student participants ($n = 5$) and an Asian student participant ($n = 1$). This one-dimensional ethnic representation eliminates the validity of comparing ethnic responses to TM interventions A, B, C, and D.

Intervention Impacts by Grade Level

Figure 4.6

Intervention Effects by Grade Level



Note. 6.0 M = 100% assignment completion. Grade 12 student participant ($n = 1$) not represented in this figure.

Figure 4.6 provides assignment completion means by grade levels 9, 10, and 11 for TM interventions A, B, C, and D for student participants ($N = 79$) accompanied by parent participants ($N = 79$). The summative data represents all teacher participants ($n = 4$). Grade 10 ($n = 42$) resulted in the highest number of student participants, followed by grade 11 ($n = 27$), and grade 9 ($n = 9$).

Table 22

Grade Level 9, 10, and 11

| <i>Grade</i> | | <i>A</i> | <i>B</i> | <i>C</i> | <i>D</i> |
|--------------|-----------|----------|----------|----------|----------|
| 9 | <i>M</i> | 5.33 | 5.22 | 4.88 | 4.55 |
| | <i>N</i> | 9 | 9 | 9 | 9 |
| | <i>SD</i> | 1 | 0.83 | 1.16 | 1.58 |
| 10 | <i>M</i> | 5.02 | 4.45 | 4.54 | 4.02 |
| | <i>N</i> | 42 | 42 | 42 | 42 |
| | <i>SD</i> | 1.75 | 1.51 | 1.62 | 1.61 |
| 11 | <i>M</i> | 5.29 | 4.66 | 5.03 | 3.70 |
| | <i>N</i> | 27 | 27 | 27 | 27 |
| | <i>SD</i> | 0.86 | 1.14 | 0.89 | 0.86 |

Note. 6.0 M = 100% assignment completion. Grade 12 participant ($n = 1$) not represented in this table.

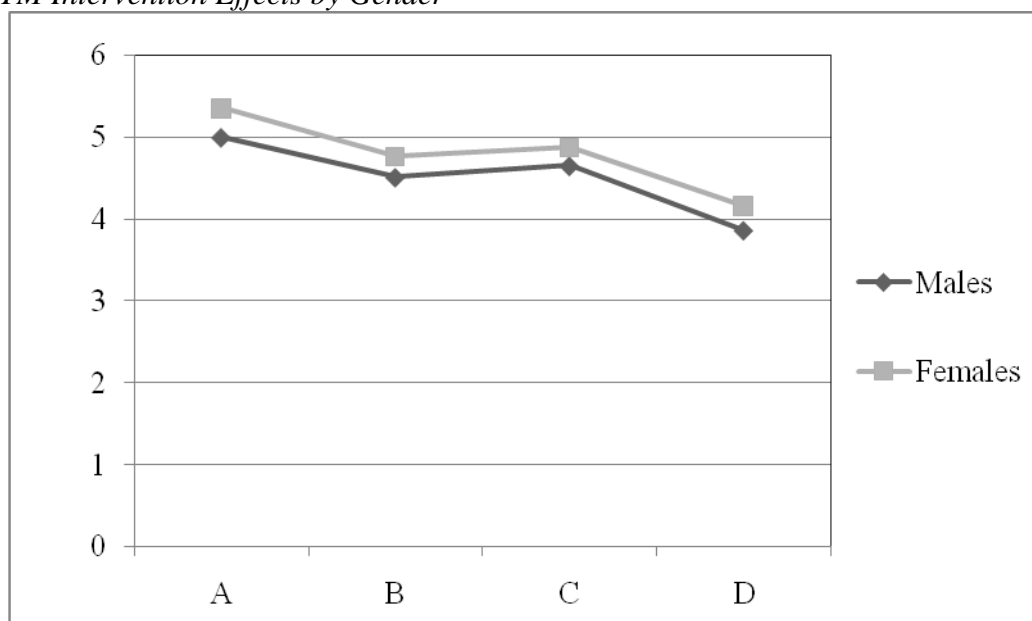
Table 22 provides assignment completion means by grades 9, 10, and 11 for TM intervention type A, B, C, and D. The total number of student participants is provided for each grade level coupled with a *SD* score by grade level and TM

intervention type. Grade 9 participants ($n = 9$) have the highest mean assignment completion rate (5.0) with TM intervention A (5.33) followed by TM intervention B (5.22), TM intervention C (4.88), and TM intervention D (4.55). Grade 11 participants ($n = 27$) had the second highest mean assignment completion rate (4.67) with TM intervention A (5.29), followed by TM intervention C (5.03), TM intervention B (4.66), and TM intervention D (3.70). Grade 10 participants ($n = 42$) has the lowest mean assignment completion rate (4.50) with TM intervention A (5.02), followed by TM intervention C (4.54), TM intervention B (4.45), and TM intervention D (4.02).

Intervention Effects by Gender

Figure 4.7

TM Intervention Effects by Gender



Note. 6.0 M = 100% assignment completion.

Figure 4.7 provides a visual comparative representation of assignment completion means determined by gender for TM interventions A, B, C, and D.

Male participants ($n = 43$) resulted in 54% of student participants followed by female participants ($n = 36$) with 46% of student participants. Figure 4.7 indicates a higher female assignment completion rate compared to males in all interventions although the difference does not appear to be significant.

Table 23

Gender Summative Data

| <i>Gender</i> | | <i>A</i> | <i>B</i> | <i>C</i> | <i>D</i> |
|---------------|-----------|----------|----------|----------|----------|
| Males | <i>M</i> | 5 | 4.51 | 4.65 | 3.86 |
| | <i>N</i> | 43 | 43 | 43 | 43 |
| | <i>SD</i> | 1.46 | 1.43 | 1.46 | 1.52 |
| Females | <i>M</i> | 5.36 | 4.77 | 4.88 | 4.16 |
| | <i>N</i> | 36 | 36 | 36 | 36 |
| | <i>SD</i> | 1.35 | 1.22 | 1.23 | 1.27 |

Note. 6.0 *M* = 100% assignment completion.

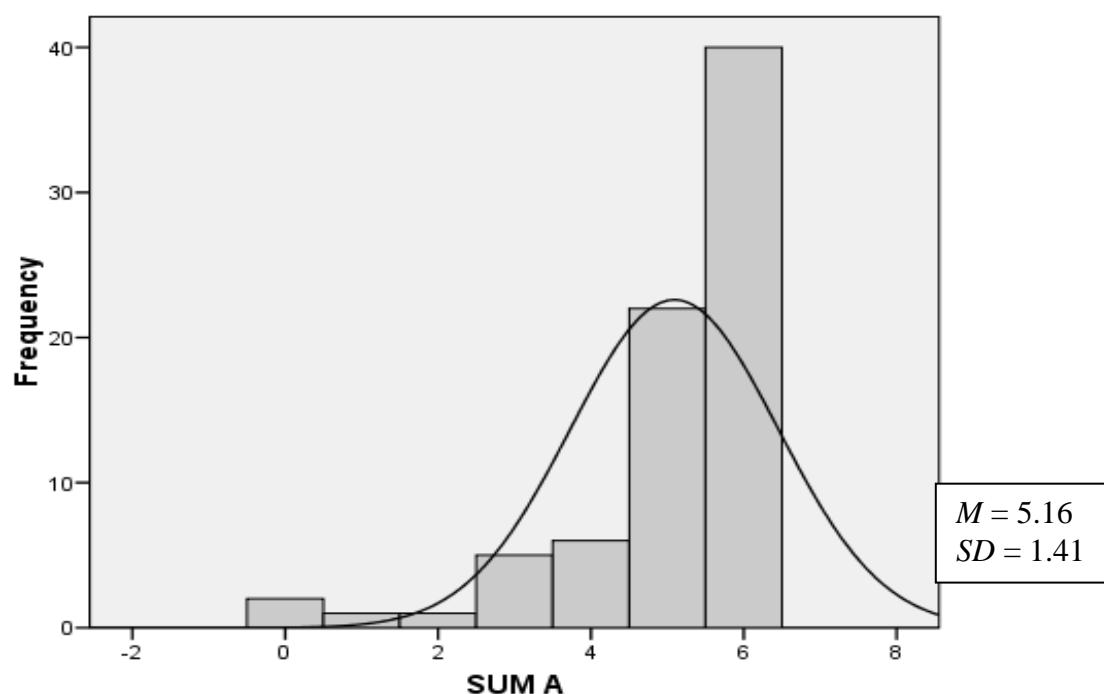
Table 23 provides the mean assignment completion rate of male and female student participants for TM interventions A, B, C, and D. The total number of student participants is provided for each gender coupled with a *SD* score for each TM intervention type. Female participants ($n = 36$) have the highest overall mean assignment completion (4.79) with TM intervention A (5.36) reflecting the highest TM intervention mean, followed by TM intervention C (4.88), TM intervention B (4.77) and TM intervention D (4.16). Male participants ($n = 43$) have the second highest mean assignment completion rate (4.50) with TM intervention A (5.0) followed by TM intervention C (4.65), TM intervention B (4.51), and TM intervention D (3.86).

Frequency Distributions

Histograms provide the opportunity to plot frequency distributions while using a curve to connect the points plotted on axis Y and X. A bell curve is overlaid on each plot for comparison purposes. Figures 4.8, 4.9, 4.10, and 4.11 provide relative frequency distributions for TM interventions A, B, C, and D. The number of assignments completed is plotted on the Y-axis and the number of occurrences for each assignment completion mean on the X-axis.

Figure 4.8

Frequency Distributions TM Intervention A (N = 79)



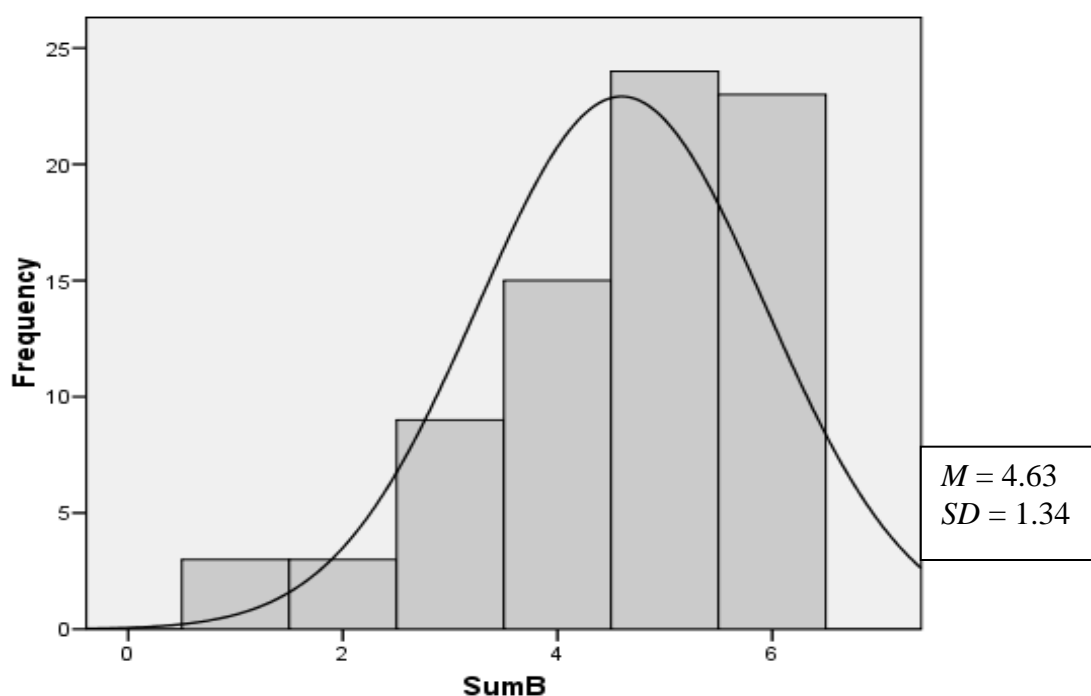
Note. 6.0 M = 100% assignment completion.

Figure 4.8 represents a negatively skewed curve, skewed to the left with the greatest number of frequencies occurring at the value near the right of the graph. TM intervention A assignment completion mean (X axis) predominantly falls within the 5 and 6 ranges with range 6 having the most frequencies. Figure

4.8 indicates TM intervention A has a high kurtosis positive value due to the extreme result of range 6.

Figure 4.9

Frequency Distributions TM Intervention B (N = 79)

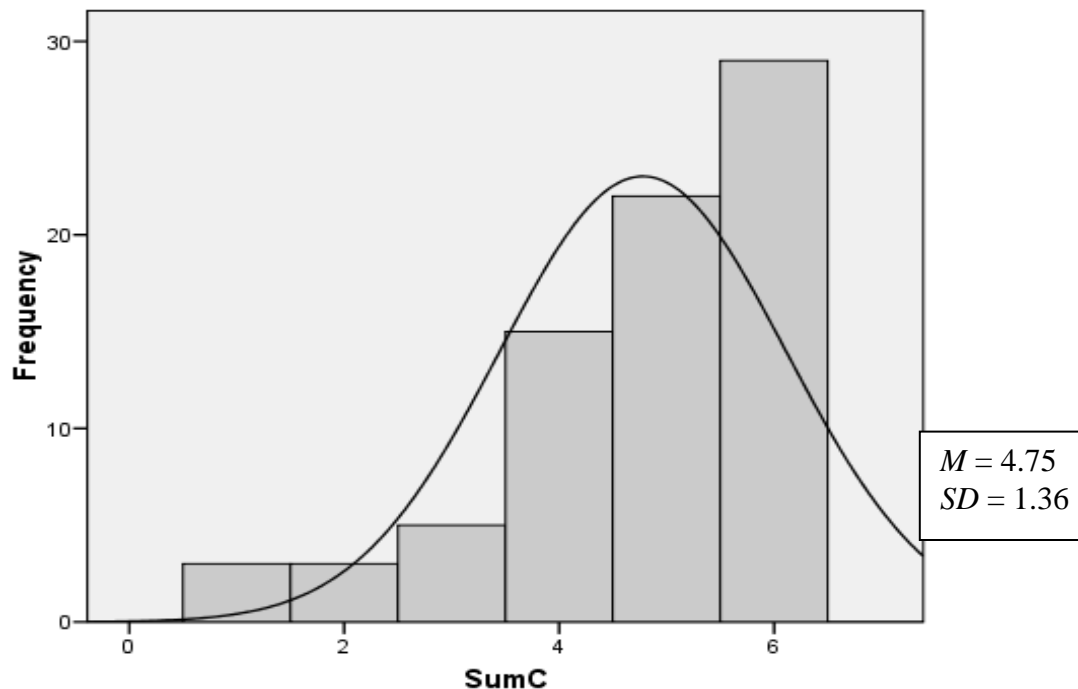


Note. 6.0 M = 100% assignment completion.

Like Figure 4.8, Figure 4.9 represents a negatively skewed curve, skewed to the left with the greatest number of frequencies occurring at the value near the middle right to far right of the graph. Although skewed to the left, TM intervention B assignment completion mean (X-axis) falls within the 4, 5 and 6 ranges with range 5 having the most frequencies.

Figure 4.10

Frequency Distributions TM Intervention C (N = 79)

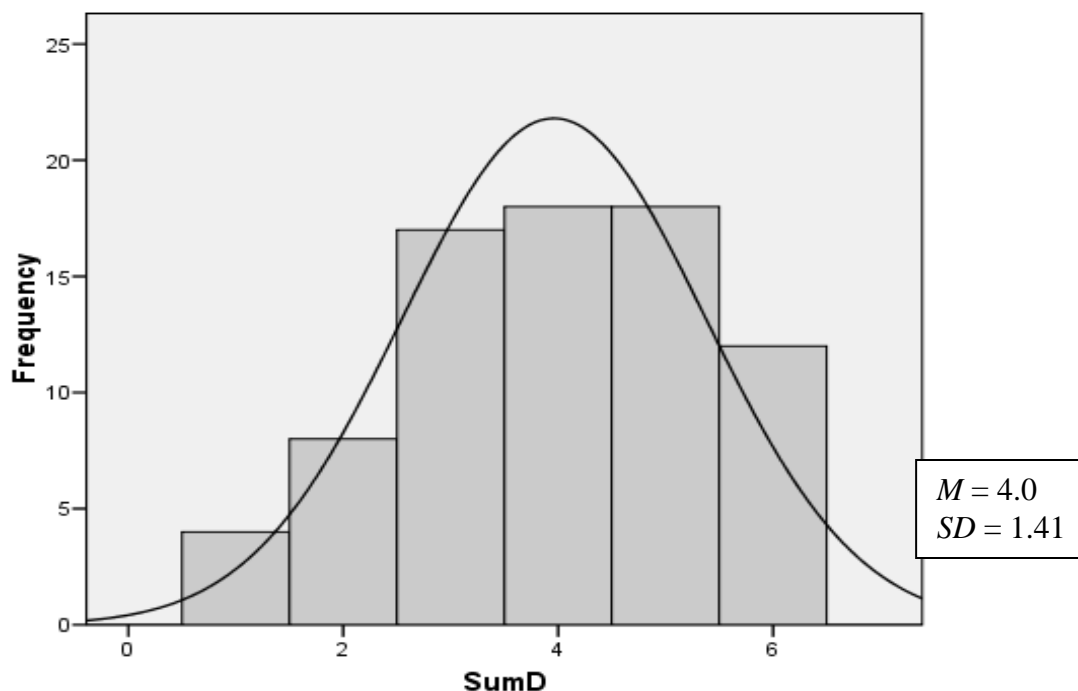


Note. 6.0 $M = 100\%$ assignment completion.

Figure 4.10 reflects the similar trends of TM interventions A and B. TM intervention C is a negatively skewed curve with the greatest number of frequencies occurring at the value near the right side of the graph. Although skewed to the left, TM intervention C mean assignment completion (X-axis) generally falls within the 4, 5, and 6 ranges with range 6 having the most frequencies.

Figure 4.11

Frequency Distributions TM Intervention D (N = 79)



Note. 6.0 M = 100% assignment completion.

Figure 4.11 provides frequency distribution results for TM intervention D, which align with the requirements for a symmetrical bell shaped curve. There is no skew for TM intervention D with mean assignment completion (X axis) generally evenly distributed in ranges 3, 4, 5, and 6. TM intervention D has the most nearly normal distribution.

Inferential Statistical Findings

A Latin square analysis of variance (ANOVA) applies when there are repeated interventions (TM interventions A, B, C, and D) and multiple other

blocking factors. The blocking factors in this study are the semester weeks sessions, situated vertically on the Latin square matrix, and the teacher participants, situated horizontally on the Latin square matrix (Table 24). The Latin square ANOVA performs a multifactor analysis of variance for the assignment completion mean as a result of the factors that include: (1) the four levels of TM interventions A, B, C, and D, (2) four teachers, and (3) four three-week semester sessions. The Latin square ANOVA especially tests for factors that have a statistically significant effect on assignment completion average.

Table 24

Balanced Classification Latin Square with Blocking Factors and Intervention

Means

| | $b_1 =$ Teacher 1 | $b_2 =$ Teacher 2 | $b_3 =$ Teacher 3 | $b_4 =$ Teacher 4 |
|---------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| $a_1 =$ Semester Weeks 1-3 | $c_1 = A$ $M = 5.83$ | $c_2 = B$ $M = 4.86$ | $c_3 = C$ $M = 5.11$ | $c_4 = D$ $M = 3.77$ |
| $a_2 =$ Semester Weeks 4-6 | $c_2 = B$ $M = 5.11$ | $c_4 = D$ $M = 3.64$ | $c_1 = A$ $M = 5.44$ | $c_3 = C$ $M = 3.27$ |
| $a_3 =$ Semester Weeks 7-9 | $c_3 = C$ $M = 5.55$ | $c_1 = A$ $M = 5.24$ | $c_4 = D$ $M = 4.77$ | $c_2 = B$ $M = 3.5$ |
| $a_4 =$ Semester Weeks 10-12 | $c_4 = D$ $M = 3.94$ | $c_3 = C$ $M = 5.0$ | $c_2 = B$ $M = 5.22$ | $c_1 = A$ $M = 4.11$ |

Note. 6.0 $M = 100\%$ assignment completion.

Table 24 shows the placement of each independent variable, the four levels of TM interventions A, B, C, and D in the Latin square matrix with A = text message to parents and students, B = text message to students, C = text message to parents, and D = text message to students and parents-non specific assignment. The dependent variable is the assignment completion rate. Each square ($N = 16$) reflects the number of mean observations, which lists a mean score for assignment completion, based upon text message intervention type, teacher, and semester week session.

Table 25 lists the data required to perform a Latin square ANOVA using statistical software SPSS 15.0. To analyze the data, assignment completion mean observations ($N = 16$) are listed as assignment completion rate (observation), teachers represent the column classifier, semester weeks represent the row classifier, followed by the order of each TM intervention.

Table 25

Column Classifier for Latin Square Analysis of Variance

| <i>Assignment Mean</i> | <i>Teacher</i> | <i>Semester Week Sessions</i> | <i>Order of Interventions</i> |
|------------------------|----------------|-------------------------------|-------------------------------|
| 5.83 | 1 | 1 | 1 = A |
| 5.11 | 1 | 2 | 2 = B |
| 5.55 | 1 | 3 | 3 = C |
| 3.94 | 1 | 4 | 4 = D |
| 4.86 | 2 | 1 | 2 = B |
| 3.64 | 2 | 2 | 4 = D |
| 5.24 | 2 | 3 | 1 = A |
| 5 | 2 | 4 | 3 = C |
| 5.11 | 3 | 1 | 3 = C |
| 5.44 | 3 | 2 | 1 = A |
| 4.77 | 3 | 3 | 4 = D |
| 5.22 | 3 | 4 | 2 = B |
| 3.77 | 4 | 1 | 4 = D |
| 3.27 | 4 | 2 | 3 = C |
| 3.5 | 4 | 3 | 2 = B |
| 4.11 | 4 | 4 | 1 = A |

Note. 6.0 *M* = 100% assignment completion.

Table 26

Latin Square Analysis of Variance

| Dependent variable: Assignment Completion Rate (mean) | | | |
|---|-------------|--------------|-------------|
| Factors | | | |
| (1) Semester Weeks | | | |
| (2) Teachers | | | |
| (3) Text Message Intervention | | | |
| Number of complete cases: 16 (squares in the Latin Square matrix) | | | |
| Source of Variation | Sum Squares | DF | Mean Square |
| Semester Weeks | 0.64015 | 3 | 0.213383 |
| Teachers | 5.68355 | 3 | 1.894517 |
| Interventions | 2.58685 | 3 | 0.862283 |
| Residual | 1.01015 | 6 | 0.168358 |
| Total | 9.9207 | 15 | |
| F ratio (rows/semester weeks) = 1.267436 | | $P = 0.3669$ | |
| F ratio (columns/teachers) = 11.252883 | | $P = 0.0071$ | |
| F ratio (TM interventions) = 5.121715 | | $P = 0.043$ | |

In Table 26 the Latin Square ANOVA decomposes the variability of assignment completion mean (dependent variable) into contributions due to various factors. A Latin Square ANOVA evaluates if semester weeks, teachers, and the four levels of text message interventions (factors) had an effect on assignment completion rate at the 95% confidence level.

Null Hypotheses Results

Simply examining the mean differences of TM interventions does not provide statistical validity or probability of findings. Inferential statistical findings for this study include the use of a Latin square analysis of variance (ANOVA). This type of ANOVA test allows for data results when there are repeated interventions (TM interventions A, B, C, and D) and multiple blocking factors (semester week sessions and teachers). The Latin Square analysis of variance allows for the examination of the findings associated with (3) null hypothesis statements.

In order to interpret the p-value score for this study, there must be an assumption that there is no association between the independent variable (TM interventions) and the dependent variable (assignment completion rates). When it is assumed that there is no association, this is called the null hypothesis. A 4x4 Latin Square design allows for the examination of the following three null hypothesis statements.

1. ($H_0 : \mu_1 = \mu_2$) states there is no significant difference in assignment completion rate between TM interventions A, B, C, and D.

μ_1 = assignment completion rate

μ_2 = four levels of text message interventions

The core of null hypothesis statement (1) targets the specific impact of TM interventions A, B, C and D on assignment completion. Each TM intervention has a required implementation protocol (Appendix A). This null hypothesis allows for a statistical comparison of all TM interventions. The findings demonstrate significant differences in student assignment completion in each of the TM

intervention types. By completing a Latin Square analysis of variance, the hypothesis proves to be false. A P value of 0.043, below the 0.05 threshold, results in a statistically significant effect of TM interventions on assignment completion rate at the 95% confidence level.

The findings indicated in Table 26 provide a basis for examining the probability of TM interventions A, B, C and D having a significant impact on assignment completion rate. The P value, as determined by the Latin Square analysis of variance, allows for an assessment of the findings as they relate to observed differences on TM intervention A, B, C, and D. As indicated on Table 26, a P value of 0.043 indicates the observed findings of TM interventions A, B, C, and D is unlikely to be due to chance. Furthermore, with a P value of 0.043 (4%), evidence exists that 96% of the time TM interventions will result in significant differences and 4% of the time they will be the same. The P value provides reasonable evidence that there is a significant difference on assignment completion rate (mean) using TM interventions A, B, C, and D.

2. ($H_0 : \mu_1 = \mu_2$) states there is no significant difference in assignment completion rate between semester weeks.

μ_1 = assignment completion rate

μ_2 = semester weeks

Null hypothesis statement (2) targets a comparison between assignment completion rate and semester weeks or implementation time period of TM intervention. This 12 week study calls for each teacher participant to implement a separate form of TM intervention every 3 weeks (Appendix A). The Latin Square

analysis of variance results (Table 26) provides evidence that this hypothesis proves to be false. A P value of 0.366, greater than the 0.05 threshold, demonstrates that semester weeks or the time period of intervention implementation does not have a statistically significant effect on assignment completion rate at the 95% confidence level. Null hypothesis statement (2) is not disproved.

The P value, as determined by the Latin Square analysis of variance, allows for an assessment of the findings as they relate to observed differences of assignment completion rate in semester weeks 1-3, 4-6, 7-9, and 10-12. As indicated on Table 26, a P value of 0.366 indicates observed findings of semester weeks 1-3, 4-6, 7-9, and 10-12 is likely to be due to chance. With a P value of 0.366, random sampling from identical participant populations would lead to a difference smaller than observed in 64% of experiments and larger in 36% of experiments. The P value provides reasonable evidence that there is not a significant difference on assignment completion rate (mean) by semester week implementation.

3. ($H_0 : \mu_1 = \mu_2$) states there is no significant difference in assignment completion rate between different teachers.

μ_1 = assignment completion rate

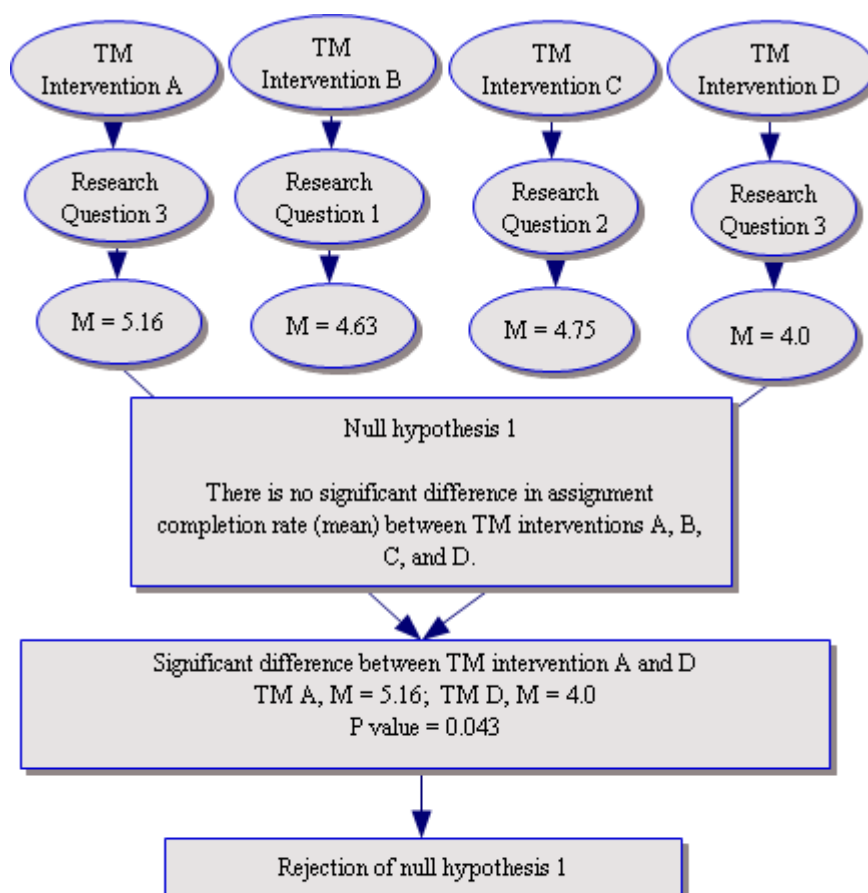
μ_2 = teachers

Four high school teachers, two of which are located at site 1 and two located at site 2 (Table 1), transmitted TM interventions to student and parent participants. Teacher participants in relation to courses include: Teacher 1 =

Biology, primarily grade 10; Teacher 2 = US history, primarily grade 11; Teacher 3 = Algebra, primarily grade 9 and 10; and Teacher 4 = US history, primarily grade 11. Null hypothesis statement (3) infers there will be no significant difference in assignment completion rate regardless of the teacher who transmitted the TM intervention. Each teacher participant followed a strict TM intervention implementation protocol. The content of the TM interventions A, B, and C relayed specific assignment information as determined by the activity created and assigned by the teacher. TM intervention D relayed non-specific assignment information. Table 26 provides an analysis of the findings for null hypothesis (3) resulting in a P value of 0.007, less than the 0.05 threshold. Therefore, it can be assumed that teachers have a statistically significant effect on assignment completion rate at the 95% confidence level. Therefore, due to the low P value score of 0.007, null hypothesis (3) proves to be false. Furthermore, with a P value of 0.007 ($< 1\%$), random sampling from identical participant populations would lead to a difference 99% of the time and $< 1\%$ of the time would the results be the same. The P value provides sound evidence that there is a significant difference on assignment completion rate (mean) for determined by the teacher participant who relayed the TM intervention.

Figure 4.12 provides a comprehensive review of the data results for research questions 1, 2, and 3 while providing statistical evidence resulting in the rejection of null hypothesis (1). A combination of descriptive and inferential statistical results is necessary in order to come to a conclusion regarding the specific impacts of TM interventions A, B, C, and D.

Figure 4.12

Intervention Comparison

Note. 6.0 M = 100% assignment completion. P Value threshold set at 0.05. P Value calculated using Latin Square analysis of variance (Table 26).

Summary

The results of the statistical analysis of the data support the goal of this study, which was to determine the impact that text messaging communication by a teacher to students and parents has on assignment completion. The results of this study include descriptive and inferential statistical data. Teacher participants ($N = 4$) transmitted 474 text messages (Table 5) to student ($N = 79$) and parent ($N = 79$

if required) participants during the experimental phase of this study. There are statistically significant differences between the student assignment completion means for TM intervention A (5.16) and TM intervention D (4.0). Teacher participants 1, 2, and 3 have similar data results while Teacher 4's data results are not comparable. This study is considered ethnically one-dimensional as a result of mostly Caucasian student participation. Grades 10 ($n = 42$) and 11 ($n = 27$) represent the majority of student participants. Student gender representation for this study includes females ($n = 43$) and males ($n = 36$) resulting in a fairly even distribution. The Latin Square analysis of variance (Table 26) provides the following inferential statistical data results: (1) TM intervention P value of 0.043 provides evidence that there is a statistically significant difference in student assignment completion rates as determined by TM intervention A, B, C, and D, (2) semester weeks P value of 0.3669 provides evidence that there is no significant difference in student assignment completion rate as determined by the semester week the intervention was distributed, and (3) teacher P value of 0.0071 provides evidence that there is a statistically significant difference in student assignment completion rates as determined by teacher ($N = 4$) participants.

The results of this study provide a bridge for further examination of the data in relationship to the three original research questions. Chapter V reviews each research question in the context of the TM intervention followed by a conclusion and recommendations.

CHAPTER V. FINDINGS, CONCLUSIONS, DISCUSSIONS, AND RECOMMENDATIONS

Chapter four discussed descriptive and inferential statistical analysis of data. This chapter presents culminating information in the following areas: (a) findings, (b) conclusions, (c) a discussion based on analysis of data, and (d) recommendations developed as a result of this study which include new areas of possible investigation. The purpose of this study involving high school teachers, students, and their associated parents was to determine if there is an association between student assignment completion rate and text message communication delivered directly to students and parents by teachers.

Findings

At the heart of this study is the measurable impact of human interaction with mobile phone text message communication. Beyond the traditional educational forms of communication such as monthly newsletters, principal and teacher letters, phone calls, and open houses, it has become increasingly apparent that mobile communication technologies are perceived as a necessity to communicate in a digital society. The findings of this study represent a single type of usage for mobile technologies, the text message or short message system (SMS). Although becoming more mainstream as a communication method, the creation, delivery, and retrieval of a text message on a mobile cell device has the

ability to revolutionize an individual's knowledge of and immediate response to an existing condition.

Each teacher participant was responsible for creating and sending text messages to students and respective parents of their high school level class (Appendix A and Table 5). The participating research sites of this study, two comprehensive high schools in central Oregon, are representative of most traditional grade 9-12 public high schools. Each participating class of students represented its own micro-culture. A micro-culture is defined as the unique classroom characteristics of students such as grade level, achievement, ethnicity, gender, economic standing, and age. Specific protocols were administered (Appendix A) by all teacher participants in order to maximize consistency in the experimental phase of the study. All student and parent participants, regardless of teacher, the micro-culture of the class, or research site received text message interventions consistently as determined by experimental protocols (Appendix A) and the Latin square matrix (Figure 3.4). The research questions for this study are:

1. Is there a significant difference in student assignment completion rate if students receive text messages on their mobile phones regarding class assignments?
2. Is there a significant difference in student assignment completion rate if parents receive text messages on their cell phones regarding class assignments?
3. Is there a significant difference in student assignment completion rate if both parents and student receive text messages on their cell phones regarding class assignments?

Summative Findings

The research questions for this study specifically examined the effect of TM interventions A, B, C, and D had on student assignment completion rates. Table 27 provides (1) summative descriptive data for all participants in the study: teachers ($N = 4$), students ($N = 79$), and parents ($N = 79$), (2) TM intervention recipient requirements, and (3) a snapshot of the most effective TM intervention.

Table 27

Summative TM Intervention by Mean, SD and Recipient

| <i>Intervention</i> | <i>M</i> | <i>SD</i> | <i>Recipient of TM Intervention</i> |
|---------------------|----------|-----------|-------------------------------------|
| A | 5.16 | 1.41 | Parents and Students |
| B | 4.63 | 1.34 | Students |
| C | 4.75 | 1.39 | Parents |
| D | 4.0 | 1.41 | Parents and Students (non-specific) |

Note. 6.0 M = 100% assignment completion.

Table 27 clearly shows TM interventions A and C having higher mean scores, followed by TM intervention B and TM intervention D. The summative findings provide evidence that there is a significant difference if students (and parents if applicable) receive a text message regarding a specific class assignment compared to a non-specific assignment text message. Clearly, targeted and specific classroom assignment information communicated in a venue that is conveniently accessible has an impact on student assignment completion. Further evidence is provided by the conclusions of null hypothesis 1 which states there is no significant difference in assignment completion rate (mean) between TM intervention A, B, C, and D. This null hypothesis proves to be false as

determined by the *P* value of 0.043 (Table 26), which demonstrates there are significant differences in assignment completion rates as determined by TM intervention type. It is increasingly clear that comprehensive communications from teachers to both students and parents have a powerful impact on student achievement.

Research Questions

Interpreting the impacts of TM interventions A, B, C, and D as they relate to the research questions of this study provides deeper understanding of why differences exist. Research Question 1 asks if there is a significant difference in student assignment completion rate if students (TM intervention B) receive text messages on their mobile phones regarding class assignments. Students consistently responded to TM intervention B, as determined by the *SD* score of 1.34. This tells us that high school age students view and respond to text message communication in similar ways. There seems to be acceptance of high school sophomore and junior level students in reaction to teacher initiated communication using a portable cell device. This acceptance is a direct result of using portable technologies that currently exist and are used on a regular basis by most students, although, targeting a specific audience (as determined by TM intervention B) has limitations. This results in a non-comprehensive communication strategy, not allowing parents to receive class assignment information, therefore breaking down the communication out of school about class assignments.

Research question 2 asks if there a significant difference in student assignment completion rate if parents (TM intervention C) receive text messages

on their cell phones regarding class assignments. There is ample research outlining the barriers of teacher to parent communication such as lack of teacher time, employment hours, antiquated school communication systems, and language roadblocks (Berger, 2004; McCarthy, 2000; A. Y. Ramirez, 2001; Strom & Strom, 2002; Watkins, 1997). TM intervention C is clearly effective as results indicated in Table 27 demonstrate. This outcome may be attributable to the notion that the parent represents the authority role in the home; therefore, parents receiving a text message will communicate expectations to their children. TM intervention C demonstrates the importance of schools communicating with the authoritative figure in the home. There is clearly a positive impact on academic achievement. An informed parent translates into improved academic success for the student. Uses of the mobile phone by a parental figure to receive school related information changes the complexion of when and where information can be received. The physical location of a parent or times of day are no longer barriers to communication. Although, with an *SD* score of 1.36, TM intervention C reflects a high range of student response inconsistencies. Possible reasons include a knowledge gap in understanding how to work text messaging on a mobile phone, indifference or lack of investment in their student's education, or noncompliance of the student to complete assignments.

Research Question 3 asks if there a significant difference in student assignment completion rate if both parents and students (TM interventions A and D) receive text messages on their cell phones regarding class assignments. TM interventions A and D reflect comprehensive communication in which both the parents and students receive information (Henderson & Mapp, 2002). All

members receive consistent and simultaneous information regarding class assignments. TM interventions A and D remove the need for assurance, the act of checking to make sure a message was received by one member or another. The findings of this study consistently show a more positive response to TM intervention A, which calls for the content of the text message to be related to a specific assignment rather than to the general nonspecific text message called for by TM intervention D. TM intervention A has the highest assignment completion mean for this study but also has a *SD* score of 1.41 signaling a high disparity in student response. TM intervention D has lowest assignment completion mean with a *SD* score of 1.41. Consistent responses are not equivalent to positive outcomes. For example, TM intervention D's low *SD* range reflects student response consistency, but this is a result of consistently low rates of student assignment completion. When comparing TM interventions A and D, there is strong evidence that communication must be specific or detailed in order for positive student outcomes to emerge.

Conclusions

High School teachers from the state of Oregon were responsible for applying four types of interventions to students and parents and collecting data. Conclusions of this study focus on research question results and associated null hypothesis statements. By comparing the results of TM interventions A, B, C, and D, an impact on assignment completion is clear. TM intervention A associated with research question 3 produces a mean score of 5.16, followed by TM

intervention C associated with research question 2 produces a mean score of 4.75, TM intervention B associated with research question 1 produces a mean score of 4.63, and TM D associated with research question 3 produces a mean score of 4.0. By evaluating the TM intervention results collectively, it is determined that TM intervention A has the most significant impact on student assignment completion with TM intervention D having the lowest impact. TM interventions A and D both call for the student and parent to simultaneously receive a text message. The distinguishing factor that separates TM interventions A and D is TM intervention A requires the text message to contain a content of a specific assignment (Appendix T) compared to TM intervention D which requires a general-non specific text message (Appendix U). This suggests a clear relationship between communication that relays specific assignment information and completion of the assignment (Henderson & Mapp, 2002; Strom & Strom, 2002). The Latin Square analysis of variance provides data evidence that determines TM intervention differing impacts on student assignment completion. Null hypothesis (1) is rejected due to a *P* value of 0.043, which provides reasonable evidence that the impacts of TM interventions A, B, C, and D have significant differences.

Discussion

The discussion and presentation of the major implications regarding this study are presented in this section. The discussion identifies areas deemed to be of considerable interest to the study and include the following: (1) school

communication, (2) research inconsistencies, and (3) student, parent, and teacher participants.

School Communication

The focus of this study was to investigate the impact of targeted school communication by teachers to students and parents. Student assignment completion rates were used as the basis for determining the impact of school communication. School communication takes on many forms, and the purposes differ depending on the audience and information transmitted (Berger, 2004).

Roadblocks exist in a school's ability to communicate effectively with students and parents. Defining the differences of one-way and two-way communication is required in order to provide context for the types of communication interventions used in this study. One-way communication may come in the form of notifications, newsletters, static web sites, or suggestion boxes. The defining criterion for one-way communication is absence of the ability to reply. Two-way communication requires interaction between participants, usually allowing for parents and students to voice concerns or desires. Watkins (1997) suggests there is a significant difference in the amount of communication (one-way) versus quality of communication (two-way). Text messaging takes on the form of a quick one-way notification system. There is irrefutable evidence supporting the surging use of text messaging as a primary form of mobile communication. For example, 4.7 billion text messages were sent each month in 2004 compared to 7.3 billion messages in 2005, 12.5 billion in 2006, increasing to 75 billion in June of 2008 (Wireless Quick Facts Mid Year Figures, 2008).

This research study examined the use of text messaging used by teachers to communicate with students and parents. Most striking is the general agreement that communication that relays specific, pertinent, non-generalized, school related information has the most positive impact on student and parent engagement. The TM intervention types used in this study allow for a comparison of specific and nonspecific assignment information provided to students and parents.

The results of this study provide a plethora of data encompassing TM intervention impacts by gender, grade level, and teacher. The central focus of this research study was to measure the collective impact of TM interventions A, B, C, and D on student assignment completion. The impacts of the TM interventions can be distinguished by two major criteria: specific or nonspecific text message content and the audience (recipient) of the intervention. This evidence suggests that there is a fundamental difference in TM intervention impacts as determined by the recipient (audience) of the text message.

Descriptive statistical measures were used in order to complement the use of the Latin Square analysis of variance and also allow for a discussion regarding the impact of specific vs. non-specific text message content. The findings of this study provide evidence that specific assignment information provided by TM intervention A (5.16), B (4.63), and C (4.75) result in an overall higher assignment completion mean compared to non specific assignment information TM intervention D (4.0) with 6.0 equivalent to 100% assignment completion (Table 6). The consistency of TM intervention results can be further justified by seeing comparable assignment mean scores for each TM intervention type

regardless of gender type or grade level of student recipients while also taking into consideration the teacher and time period the TM intervention is transmitted.

There is increasing evidence to suggest parents are reluctant to return voice phone messages or regularly attend parent teacher conferences (Berger, 2004). By using text messaging as the communication method in this research study, student assignment information is delivered directly to the recipient (student and parent), regardless of location, as opposed to the recipient having to retrieve or “go to” the information. The power of this type of one-way communication allows for a seamless, non-delayed, and instant notification of student assignments. In a society where mobile communication is becoming more the norm as opposed to the exception, instant delivery of school related information to a recipient allows for collapse of many school communication roadblocks.

As indicated by the results of this study, TM intervention A has the highest assignment completion mean score. This prompts a discussion of the relevance of TM intervention A, which requires both the student and parent to receive simultaneous text message notifications containing specific assignment information. Beyond the measured assignment completion rate, mobile communication delivery to a student and parent links all vested parties resulting in comprehensive communication, teacher to parent and child, and child to parent. Mobile technologies foster a modernization process of school communication which embraces a cooperative approach between teacher, parents, and students (Strom & Strom, 2002).

Research Inconsistencies

The results of this study generally find in favor of TM intervention A, resulting in the highest assignment completion rate. This validity of this study is contingent on several factors that have an impact on the research results. Upon review of the data results, inconsistencies emerge specifically aligned to Teacher 4 and the *SD* scores. This is also verified by an analysis of null hypothesis 3, which states there is no significant difference in assignment completion rate between teachers. This null hypothesis is false as determined by a *P* value of 0.007, which shows teachers have a statistically significant effect on assignment completion rates as determined by the TM intervention.

In order to examine the inconsistencies that emerge with Teacher 4, a review of teacher participants and associated requirements is necessary. Each teacher participant is considered an “experienced” public high school teacher. Students from each teacher’s class are part of general, common core classes required for graduation, thus student academic achievement profiles resemble the non-honors level student. Each teacher participant is required to follow a specific protocol (Appendix A) for transmitting each TM intervention type, regardless of class content.

Figure 4.1 provides comparative summary of assignment completion rates for each teacher participant. Teacher 3 (Site 2, Algebra I) leads all teacher participants with a 5.13 overall assignment completion means, followed by Teacher 1 (Site 1, Biology) with a 5.10, Teacher 2 (Site 2, US history) with a 4.69, and Teacher 4 (Site 1, US history) with a 3.66. Regardless of TM intervention type or implementation week of the intervention, Teacher 4 has lower

assignment completion mean scores compared to other teacher participants. The significantly lower assignment completion mean for Teacher 4 clearly raises key concerns. Pedagogical instructional techniques unique to Teacher 4 emerge as possible reasons for inconsistent Teacher 4 results.

Teacher 4 selected a US history class with similar demographic information compared to other teacher participants. Teacher 4 has six years teaching experience with 18 participating students (8 male and 10 female), primarily Caucasian. The text message content delivered by Teacher 4 (Appendix U) is consistent with other teacher participants as required by the intervention protocol (Appendix A). Regardless of communication strategy, it is widely accepted that good teaching practices have the most impact on student achievement. The consistent demographic information for participating teachers, students, and school sites coupled with consistent TM intervention protocols, raises concerns of Teacher 4's instructional pedagogical effectiveness. Text message communication will do little to trigger student interest if teacher led instructional practices do not provide an adequate basis for student engagement.

Additional results produced by Teacher 4 demonstrate a significantly lower assignment completion rate for students as a result of TM intervention C, which calls for text messages to be sent directly to parents only. Perhaps the lack of assignment completion as a result of TM intervention C shows a lack of parental investment in the educational process. It is clear that there is direct correlation between parent involvement and higher academic achievement and improved student attendance (Padgett, 2006; A. Y. Ramirez, 2001; Strom & Strom, 2002; Watkins, 1997).

Another plausible reason for Teacher 4 to have such significant differences in assignment completion rate may be a result of student achievement history or student grade point average. Teacher 4's student participants could have significantly lower grade point averages compared to student participants of Teachers 1, 2, or 3, resulting in lower assignment completion rate regardless of TM intervention type. Student grade point averages provide an indicator of student achievement level and engagement. This study produces no evidence relating to use of prior student achievement levels as a basis for determining the impact on TM intervention types. An evaluation of student grade point averages before this study was conducted would provide an indicator of student achievement levels, thus providing criteria to compare student achievement levels corresponding with TM intervention types.

An important source of discussion is the measurable rate of consistency for student response to TM interventions. This is indicated by *SD* score. TM intervention A has the highest student assignment completion mean (5.16) and has a *SD* score of 1.41. Although, with a *SD score* of 2.82, TM intervention A has a wide disparity or range of student responses compared to TM interventions B, C, or D.

Recommendations

Research Aims and Conclusions

The central aim of this research study was to determine the impact of text messaging (TM) communication sent from teachers to students and parents on

student assignment completion. The creation and implementation of the Latin Square design allowed for the original research aims of this study to be met as well as providing opportunities to examine data indirectly related to the central aim of this study. The results of this study suggest text messages that contain specific information about class assignments delivered to students and parents have an immediate positive impact on student assignment completion rates. Additional indirect research aims using a Latin Square design include: (a) evidence indicating the timeframe or week of application of the TM intervention has a minimal impact on student assignment completion, while (b) individual teacher participants (who transmit the TM intervention to students and parents) result in significant differences in student assignment completion rates. A combination of factors provides results that lead to differing results attributed to teachers. For example, indirect impacts of TM interventions may originate from the level of student response as dictated by the existing achievement or motivational levels of students, regardless of the teacher who transmits the TM intervention. This experiment required teachers to transmit the text message interventions after school hours. Perhaps teachers who transmitted the text message during late afternoon or evening hours resulted in greater student response compared to transmitting the message shortly after school hours, assuming families are communicating more during dinner or evening activities.

The data results of this study are a direct consequence of teacher participants fulfilling expected roles and responsibilities. The aim of measuring the impact of text message communication on assignment completion is in direct correlation to the TM intervention application procedure (Appendix A). In order

to reflect on the likelihood this research project meets its aims, it is essential for teacher participants to be consistent with TM intervention application and data collection procedures. Not only does this study provide measurable data results to meet the goals of the original research aims, it also opens the discussion for the implementation of modern forms of mobile communication to become commonplace in schools.

This study also allows for the examination of student assignment completion based on student subgroups, which include gender, grade, and a minimal review of ethnicity. During the infancy of this research project's experimental design, a primary aim was to target and recruit a diverse student participant population thus allowing for valid conclusions to be made for student subgroups. As the results indicate, this study includes various student subgroups but the preponderance of student participants represent Caucasian grade 10 and 11 students. This is primarily a result of two factors: (a) the research sites being predominantly Caucasian in the geographic region of central Oregon and (b) selecting core level classes which are primarily identified with grades 10 and 11.

Conclusions on the Research Process

The academic class schedule for each participating high school research site consists of a two semesters (fall and spring), each 18 weeks in length with classes reflecting a 4x4 block (90 minute) schedule. A student's typical schedule consists of four courses each semester. The timeframe for the experimental phase of this study occurred during the fall semester of the school year with TM interventions applied for twelve consecutive weeks. The experimental phase of the study beginning after classes started provided the following opportunities:

1. Recruitment of teacher participants based on existing classes and existing student enrollment.
2. Student schedule changes were minimized, preventing student and parent participant drops.
3. Adequate time to communicate directly with students and parents to ensure IRB (Institutional Review Board) compliance.
4. The application of TM interventions in four three-week increments by teachers to students and parents (as determined by the Latin Square configuration).
5. Completion of the experiment before the conclusion of the fall semester.

The use of the Latin square design allowed for the research aims and specific purposes of this study to be met. Although, by simplifying the research design, long term TM intervention impacts can be measured by targeting specific participant groups. Using one teacher participant and all of his or her associated classes and corresponding students would result in the following: (a) consistent teaching methods and assignment delivery to students, (b) target specific groups (i.e. grade level or ethnicity) of students within one learning environment, and (c) implementation of a control and treatment group, thus producing a comparison of student assignment completion rates.

As stated, the school class schedule of the participating high school research sites allows students to complete a class by the semester break. Due to the high school research sites' existing school schedule, the TM application phase of this study only lasts a maximum length of a semester, thus preventing the experiment from continuing for the entirety of the school year (36 weeks).

Perhaps a full school year TM intervention application as defined in this study would provide a more reliable source of data. It is arguable that 12 weeks of TM intervention application does not provide adequate data due to a halo effect. The teacher and student participants have not used text messaging communication previously for school purposes; therefore it could be argued that the data results are not an accurate representation of long term uses of text messaging communication in schools. Although, support exists of this study's 12 week time frame due to the conclusions of null hypothesis 2. Evidence suggests that semester weeks or the transmission time period of each TM intervention had no impact (Table 26). Therefore, it is clear that parents and students respond similarly to TM interventions regardless of when the transmission of the text message occurs.

Upon review of the research process itself, there are strategies that if implemented would further enhance the validity of the data results. One strategy consists of reviewing student participants' grade point averages (GPA) before the application of the TM interventions. A review of the students' GPAs as associated by teacher provides the ability to address whether or not the TM interventions actually have an impact on student assignment completion. For example, Teacher 3 has the highest student assignment completion average as a result of the TM interventions with a score of 5.13 compared to Teacher 4 which as the lowest student assignment completion average of 3.66. Perhaps the student participants in Teacher 3's class simply have a higher overall GPA compared to Teacher 4, magnifying the relationship between GPA and assignment completion compared

to TM intervention and assignment completion. Since a review of existing GPAs was not conducted, the following questions emerge:

1. Did the TM interventions impact students who are considered high achieving as determined by a high GPA?
2. Did the TM intervention impact students who have a low GPA?
3. Would the implementation of a pre and post (experimental phase) GPA analysis for each participating student allow for a more robust interpretation of the impacts of text message communication?

In order for students and parents to participate in this study, ownership of a mobile phone is required. The recruitment of student and parent participants who own a mobile phone and agree to participate in this study presented challenges. Each student and parent was called in order to verify participation, review the aims of the study, and ensure all students and parents understanding of how to retrieve a text message. Personal contact between the researcher and all of the study's participants was crucial in ensuring IRB compliance and experimental protocols. Initial recruitment of students and parents resulted in seven students who wanted to participate but could not due to not owning a mobile phone. In an effort to overcome this barrier, Verizon Wireless Corporation (formerly Unice) offered a reduced cost cellular plan to all students interested in participating in the study. The reduced cost cellular plan had no impact on student or parent recruitment thus providing continued support for the threat of an emerging digital divide based on financial barriers to technology.

Teacher participants played a significant role in this study. The design of this study required text messages to be simultaneously sent by teachers to students

and parents in bulk fashion. Using a readily available email application such as Gmail allowed teacher participants to send text messages in bulk much like sending an email (Figure 3.7). The application of the TM interventions during the experimental phase of this study was sound. Each text message when transmitted was confirmed upon delivery. If a text message was not transmitted, a non-deliverable notice was sent to the sender (teacher) much like an email that is non-deliverable.

Teachers were responsible for data collection associated with students completing assignments in accordance with each text message intervention. Specific TM intervention protocols (Appendixes A) are followed to foster consistency for all teachers. Data collection for this study reflects a consistent process to ensure reliable data entry (see Appendixes N – Q). The research design allows communication between the teacher participants and researcher to ensure understanding and answer any questions regarding TM intervention application and data collection procedures.

Areas of Future Research

This study represents a one-dimensional ethnic study primarily consisting of a Caucasian participant population. Studies need to be conducted to understand the impact of mobile communication in diverse demographic areas such as multiethnic suburbs or metropolitan regions. This will provide a context to more broadly interpret data results. Probable research questions that focus on the relationship students and parents have with their mobile phone include:

1. What types of mobile phone communication tools (i.e. text messaging, voice, or multimedia) do students and parents prefer to use?

2. Do students and parents view mobile phones in similar ways, such as an extension of self, used primarily for social networking and peer communication?
3. What are student impressions of using their personal mobile devices for official school communication?

Some student participants in this study displayed signs of hesitancy in using their personal mobile phone devices to receive text messages that contained school related information (Appendix V). Perhaps students like to have full control over content received and sent on their phones leading to the presumption that they prefer peer-to-peer mobile interaction compared to communication delivered from authority figures or official school “business.”

There is a lack of existing research deciphering the specific usages of mobile phone applications based on age groups (Figure 2.2). Particularly in relationship to this study, an area of possible research is to examine the impact of text messaging on different age groups. Perhaps the relationship middle-aged students have with their mobile phones is different from high school aged students. Also, due to the existing evidence that suggests younger aged parents use mobile phone technologies more than older parents, a framework emerges to conduct research of elementary school communication given the possibly younger age of parents. Studies need to examine the usage differences based on age in order to determine the probable impacts of text messaging used as a school communication means.

This study reinforces the notion that digital technologies are reshaping the way information is transmitted to recipients. This study focuses on

communication technologies that push (delivered to a mobile phone) information to parents and students rather than having to retrieve information (search a web site). Areas of future studies may evaluate the impacts of push versus retrieve communication. Perhaps if school related information (i.e. parent conference date, sporting events, open house, or PTA) was delivered directly to the mobile phone of a parent and student, community involvement and general awareness of school events would increase thus leading to more community participation.

Putting Into Practice

The results of this study help inform school administrators and teachers of the rapidly changing nature of school communication given that mobile phone devices have become an extension of students and parents. Students have instant access to information. The age of non-delayed information retrieval forces a reexamination of communication methods that reflect the need for instantaneous information. School communication systems need to provide school administrators, teachers, and other school staff a simple and effective method to directly connect to parents and students using mobile technologies. Schools must identify the methods of communication most used by members of a school community in order to implement a comprehensive communication plan. Schools also need to ensure that the use of mobile communication does not disenfranchise members of a school community due to economic or language barriers.

Embracing mobile technologies in educational settings requires a cultural shift that requires school technology use policies to reflect societal communication trends. Embracing mobile phone usage is creating a cultural battle in schools. School staff either embrace student use of mobile devices to

supplement the educational process, or school staff believe mobile devices are not educationally relevant to teaching and learning. Schools need to shift and modernize in the 21st century in order to continue to be centers of academic achievement while also producing students who are competitive in a global society. Thus, it is necessary for schools to align communication with societal expectations while maintaining productive educational environments.

The transmission of text message information from school to students and parents generally will originate from two school entities, the school administration and individual classroom teachers. Use of text messaging can be easily implemented at the school administration level. Some school administration text messages to the community include: notifications regarding school closures due to inclement weather, emergencies, school wide community announcements (parent teacher conference dates), activities, or sports updates. A more complex challenge emerges if the goal of a school is to have a systematic text messaging communication system in which all teachers use this form to contact students and parents. It is important to realize teaching is a human act. Teachers generally employ teaching methods that are unique in style and delivery. Therefore individual teacher perceptions of technology play a significant role in whether or not teachers will embrace new forms of mobile communication.

In order to implement the use of mobile communication tools, a communication plan needs to be developed by all educational stakeholders. Embracing the following initiatives is critical for success:

1. Support from central school district administration and board of education for individual schools to implement digital communication strategies. This

support will allow school principals to encourage individual teachers to embrace 21st century learning skills reflected in mobile digital technologies.

2. Experimentation in schools is underutilized. With guidance from school administration, and higher education partnerships, teachers need to be given action research opportunities to experiment with mobile forms of communication to measure the impact on the educational process. Teachers should be given every opportunity to innovate and should not be restricted by school-based technology policies that are not aligned to current communication methods.
3. Central school administration officials need to provide continual professional development opportunities for teachers and school administration. This will allow for the understanding of new communication technologies while reviewing potential positive impacts of mobile digital communication.
4. School principals need to provide school sites the opportunity to focus on teaching students appropriate use of mobile devices while also educating parents about mobile phone usage policies. A community technology forum, hosted by the school, will allow all interested community members and parents to learn about mobile technology educational applications while also addressing expectations of use by students. Schools need to communicate with students individually, in classrooms, and in school wide assemblies appropriate and inappropriate uses of mobile devices. The appropriate time to use mobile devices within a school day needs to be

clear to students while also enforcing student disciplinary consequences if inappropriate behavior emerges. Complete elimination of mobile devices from a school setting is neither realistic nor enforceable.

5. The development of a high school level course for students to learn about the social, ethical and legal impacts of using digital forms of communication. A balance must exist in schools that embraces appropriate use of mobile devices yet maintains an educational environment that encourages face-to-face communication and interaction.

A shift to mobile cell communication has become a standard form of communication and is changing the way society shares information. In order for schools to become 21st century learning centers, schools have no choice but to shift and embrace emerging forms of communication technologies.

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APPENDICES

Appendix A Teacher Protocol and Intervention Implementation Timeline

| General Teacher Protocol | | Specific Teacher Protocol | |
|--------------------------|----------------|---------------------------|---|
| Week | Teacher 1 | Intervention Dates | Biology |
| Weeks 1-3 | Intervention A | 10/15/07-11/2/07 | A =text to parents and students |
| Weeks 4-6 | Intervention B | 11/5/07-11/30/07 | B =text to students |
| Weeks 7-9 | Intervention C | 12/03/07-12/21/07 | C =text to parents |
| Weeks 10-12 | Intervention D | 1/7/2008-1/25/2008 | D =text to parents and students (non-specific) |
| | | | |
| Week | Teacher 2 | Intervention Dates | U.S. History |
| Weeks 1-3 | Intervention B | 10/15/07-11/2/07 | B =text to students |
| Weeks 4-6 | Intervention D | 11/5/07-11/30/07 | D =text to parents and students (non-specific) |
| Weeks 7-9 | Intervention A | 12/03/07-12/21/07 | A =text to parents and students |
| Weeks 10-12 | Intervention C | 1/7/2008-1/25/2008 | C =text to parents |
| | | | |
| Week | Teacher 3 | Intervention Dates | Algebra I |
| Weeks 1-3 | Intervention C | 10/15/07-11/2/07 | C = text to parents |
| Weeks 4-6 | Intervention A | 11/5/07-11/30/07 | A =text to parents and students |
| Weeks 7-9 | Intervention D | 12/03/07-12/21/07 | D = text to parents and students (non-specific) |
| Weeks 10-12 | Intervention B | 1/7/2008-1/25/2008 | B =text to students |
| | | | |
| Week | Teacher 4 | Intervention Dates | U.S. History |
| Weeks 1-3 | Intervention D | 10/15/07-11/2/07 | D = text to parents and students (non-specific) |
| Weeks 4-6 | Intervention C | 11/5/07-11/30/07 | C = text to parents |
| Weeks 7-9 | Intervention B | 12/03/07-12/21/07 | B = text to students |
| Weeks 10-12 | Intervention A | 1/7/2008-1/25/2008 | A = text to parents and students |

Appendix B Examples of TM Interventions A, B, C, and D

| <i>TM Interventions A, B, C (Specific assignments)</i> | <i>TM Intervention D (Non-specific assignments)</i> |
|---|---|
| Complete questions 1-6 page 345 Chapter 11, Section 1 | The components of a cell will be discussed next week. |
| Read pages 12, 13,14,15. Define the terms on page 15. | Algebra equations will be reviewed- see chapter 3 |
| Write a 1 page essay summarizing the system of supply and demand discussed in class | We will be reviewing World War II, Chapter 12 |
| Bring an artifact to class that reflects a key value of your family | Environmental pollution, chapter 11, will be covered in class next week |
| Complete a map of Africa by labeling all countries. | The Industrial Revolution, chapter 5, will be covered in class next week |

Appendix C Parent Information



College of Education

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Dear Parent/Guardian:

It is necessary to collect the following information in order for this study to take place as well as providing teachers the ability to send text messages to your cell phone. **The information you provide will be kept secure and confidential to the extent permitted by law.**

PARENT/GUARDIAN INFORMATION

Parents/guardian: Please provide the following information

Do you own a cell/mobile phone? Yes (or) *No (circle one)

*If no, a mobile/cell phone may be provide to you at a reduced cost.

- Name of Parent/Guardian (print): _____
- Age: _____
- Race or Ethnic Group (circle one): American Indian, Asian, Black, White, Hispanic, or Other: _____
- Gender: Male or Female (circle one)
- Mobile/cell phone carrier (print): _____
(example: T-Mobile)
- Mobile/cell phone number with area code: _____
(example: 541-999-9999)
- Email address: _____
- Other phone: _____
- Name of son / daughter (participating in study)

- Mobile/cell number of son / daughter (participating in study)

- Mobile / cell phone carrier (print) _____

Appendix D Student Information



Dear Student:

It is necessary to collect the following information in order for this study to take place as well as providing teachers the ability to send text messages to your cell phone. **The information you provide will be kept secure and confidential to the extent permitted by law.**

STUDENT INFORMATION

Students: Please provide the following information

Do you own a cell/mobile phone? Yes (or) *No (circle one)

*If no, a mobile/cell phone may be provide to you at a reduced cost.

- Name of Student (print): _____
- (example: John Doe)
- Age: _____
- Race or Ethnic Group (circle one): American Indian, Asian, Black, White, Hispanic, or Other: _____
- Gender: Male or Female (circle one)
- Name of High School: _____
- Name of Teacher: _____
- Name of class (print): _____
(example: US history)
- What grade are you in? _____ (example: grade 11)
- Mobile/cell phone carrier (print): _____
(example: T-Mobile)
- Mobile/cell phone number: _____
(example: 541-999-9999)
- Email address: _____
- Other phone (home): _____

Appendix E Teacher 1 Data Collection

| Student ID# | Teacher | Ethnicity | Gender | Grade | a1 | a2 | a3 | a4 | a5 | a6 | b1 | b2 | b3 | b4 | b5 | b6 | c1 | c2 | c3 | c4 | c5 | c6 | d1 | d2 | d3 | d4 | d5 | d6 |
|-------------|---------|-----------|--------|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| a1 | 1 | 5 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| b1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| c1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| d1 | 1 | 5 | 0 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| e1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | |
| f1 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| g1 | 1 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| h1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| i1 | 1 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| j1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| k1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| l1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| m1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| n1 | 1 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| o1 | 1 | 5 | 0 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| p1 | 1 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| q1 | 1 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| r1 | 1 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |

Appendix F Teacher 2 Data Collection

[illegible]


Appendix G Teacher 3 Data Collection

| Student ID# | Teacher | Ethnicity | Gender | Grade | a1 | a2 | a3 | a4 | a5 | a6 | b1 | b2 | b3 | b4 | b5 | b6 | c1 | c2 | c3 | c4 | c5 | c6 | d1 | d2 | d3 | d4 | d5 | d6 |
|-------------|---------|-----------|--------|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| a3 | 3 | 5 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| b3 | 3 | 5 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| c3 | 3 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| d3 | 3 | 5 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| e3 | 3 | 5 | 0 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| f3 | 3 | 5 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| g3 | 3 | 5 | 1 | 3 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | | | | | | | | | | | | |
| h3 | 3 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| i3 | 3 | 5 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | | | | | | | | | | | | | | | | |
| j3 | 3 | 5 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| k3 | 3 | 5 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| l3 | 3 | 5 | 0 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| m3 | 3 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| n3 | 3 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| o3 | 3 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| p3 | 3 | 5 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| q3 | 3 | 5 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| r3 | 3 | 5 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | |
| s3 | 3 | 5 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| t3 | 3 | 5 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |

Appendix H Teacher 4 Data Collection

| StudentID# | Teacher | Ethnicity | Gender | Class | a1 | a2 | a3 | a4 | a5 | a6 | b1 | b2 | b3 | b4 | b5 | b6 | c1 | c2 | c3 | c4 | c5 | c6 | d1 | d2 | d3 | d4 | d5 | d6 |
|------------|---------|-----------|--------|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| a4 | 4 | 5 | 1 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| b4 | 4 | 4 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| c4 | 4 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| d4 | 4 | 5 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| e4 | 4 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| f4 | 4 | 5 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| g4 | 4 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| h4 | 4 | 5 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| i4 | 4 | 5 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 4 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| j4 | 4 | 5 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| k4 | 4 | 5 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| l4 | 4 | 5 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| m4 | 4 | 5 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| n4 | 4 | 4 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| o4 | 4 | 5 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| p4 | 4 | 5 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| q4 | 4 | 5 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| r4 | 4 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

Appendix I Teacher Codes for Data Collection

| Gender | Class/Grade | Interventions |
|---|-------------------------------|----------------------------------|
| Male = 0 | 9 = 1 | a1 = Intervention A-assignment 1 |
| Female = 1 | 10 = 2 | a2 = Intervention A-assignment 2 |
| | 11 = 3 | a3 = Intervention A-assignment 3 |
| | 12 = 4 | a4 = Intervention A-assignment 4 |
| | | a5 = Intervention A-assignment 5 |
| | | a6 = Intervention A-assignment 6 |
| Scoring | | b1 = Intervention B-assignment 1 |
| 1 = | Assignment Complete | b2 = Intervention B-assignment 2 |
| 0 = | Assignment Incomplete | b3 = Intervention B-assignment 3 |
| | | b4 = Intervention B-assignment 4 |
| | | b5 = Intervention B-assignment 5 |
| | | b6 = Intervention B-assignment 6 |
| | | c1 = Intervention C-assignment 1 |
| | | c2 = Intervention C-assignment 2 |
| | | c3 = Intervention C-assignment 3 |
| | | c4 = Intervention C-assignment 4 |
| | | c5 = Intervention C-assignment 5 |
| | | c6 = Intervention C-assignment 6 |
| | | d1 = Intervention D-assignment 1 |
| | | d2 = Intervention D-assignment 2 |
| | | d3 = Intervention D-assignment 3 |
| | | d4 = Intervention D-assignment 4 |
| | | d5 = Intervention D-assignment 5 |
| | | d6 = Intervention D-assignment 6 |
|  | | |
| Teacher | Ethnicity | |
| Biology = Teacher 1 | American Indian / Alaskan = 1 | |
| US history = Teacher 2 | Asian = 2 | |
| Algebra I = Teacher 3 | Black = 3 | |
| US history = Teacher 4 | Hispanic = 4 | |
| | White = 5 | |
| | Other = 6 | |

Appendix J IRB Approval Letter

Institutional Review Board • Office of Sponsored Programs and Research Compliance

Oregon State University, 312 Kerr Administration Building, Corvallis, Oregon 97331-2140

Tel 541-737-4933 | Fax 541-737-3093 | <http://oregonstate.edu/research/osprc/rc/humansubjects.htm>IRB@oregonstate.edu

TO: Linda Samek, College of Education

IRB #: 3678 – Modernizing School Communication Systems: Using Text Messaging to Improve Academic Performance

Level of Review: Expedited, Expiration Date: 8-5-08«**APP_VALID_THRU**»,

Approved Number of Participants: 300

The referenced project was reviewed under the guidelines of Oregon State University's Institutional Review Board (IRB). The IRB has **approved** the:

(X) Initial Application () Continuing Review () Project Revision

with a (if applicable): () Waiver of documentation of Informed Consent ()

Waiver of Consent

A copy of this information will be provided to the full IRB committee.

- **CONSENT FORM:** All participants must receive the IRB-stamped informed consent document. If the consent is in a format that could not have stamp placement (i.e. web site language, email language, etc), then the language must be exactly as the IRB approved it.
- **PROJECT REVISION REQUEST:** Any changes to the approved protocol (e.g. protocol, informed consent form(s), testing instrument(s), research staff, recruitment material, or increase in the number of participants) must be submitted for approval before implementation.
- **ADVERSE EVENTS:** Must be reported within three days of occurrence. This includes any outcome that is not expected, routine and that result in bodily injury and/or psychological, emotional, or physical harm or stress.
- **CONTINUING REVIEW:** A courtesy notice will be sent to remind researchers to complete the continuing review form to renew this project, however – it is the researcher's responsibility to ensure that continuing review occurs prior to the expiration date. Material must be submitted with adequate time for the office to process paperwork. If there is a lapse in approval, suspension of all activity including data analysis, will occur.
- **DEVIATION/EXCEPTIONS:** Any departure from the approved protocol must be reported within 10 business days of occurrence or when discovered.

Forms are available at: <http://oregonstate.edu/research/osprc/rc/humansubjects.htm>.

If you have any questions, please contact the IRB Human Protections Administrator at IRB@oregonstate.edu or by phone at (541) 737-8008.



Date: 8-6-07

Elisa Espinoza Fallows
IRB Human Protections Administrator

Appendix K Assent Document for Students



College of Education

210 Education Hall, Corvallis, Oregon 97331-3502

T 541-737-4661 | F 541-737-8971 | <http://oregonstate.edu/education>

ASSENT DOCUMENT

Project Title: Modernizing School Communication Systems
Principal Investigator: Dr. Linda Samek, OSU adjunct professor
Co-Investigator(s): Matthew Scott Crisp, OSU, School of Education

Please contact Matthew Scott Crisp if you have questions regarding the study.

Email crispm@onid.orst.edu, phone 541-598-4452

We are doing a research study. A research study is a special way to find out about something. We are trying to find out if there is an effect on student achievement in class if the teacher uses text messaging to communicate.

This form is about the study, so you can learn about the study and decide if you want to be in the study or not. You can ask any questions. After all of your questions have been answered, you can decide if you want to be in this study or not.

If you decide that you want to be in this study, we will ask you to do **[one/several]** things.

1. Sign this form and return to your teacher.
2. Complete the "Student Information" handout and return to your teacher.

We want to tell you about some things that might happen to you if you are in this study.

WHY AM I BEING INVITED TO TAKE PART IN THIS STUDY?

You are being invited to take part in this study because you are a student in a high school.

WHAT WILL HAPPEN DURING THIS STUDY AND HOW LONG WILL IT TAKE?

Students who agree to participate in the research experiment will receive text messages on their cell phones sent from a teacher. The teacher will send approximately 16 messages per month. The text messages will be general reminders of assignments, class activities, or tests. The text message will not be “customized or unique” messages but will be “bulk” messages sent to entire groups.

Text messages will be sent to students between 2:45pm and 8:00pm.

If you agree to take part in this study, your involvement will last for **approximately 12 weeks** during the fall semester of the 2007-2008 school year.

WHAT ARE THE RISKS OF THIS STUDY?

There are not major risks associated with this study.

All personal information you provide will be kept confidential and be destroyed at completion of study.

When we are done with the study, we will write a report about what we found out. **We won’t use your name** in the report.

You don’t have to be in this study. It’s up to you. If you say okay now, but you want to stop later, that’s okay too. All you have to do is tell us.

If you want to be in this study, please sign your name.

I, _____, want to be in this research study.

(Print your name here)

(Sign your name here)

(Date)

Appendix L Informed Consent Document for Parents



College of Education

210 Education Hall, Corvallis, Oregon 97331-3502

T 541-737-4661 | F 541-737-8971 | <http://oregonstate.edu/education>

INFORMED CONSENT DOCUMENT: PARENTS

Project Title: Modernizing School Communication Systems

Principal Investigator: Dr. Linda Samek, OSU adjunct professor

Co-Investigator(s): Matthew Scott Crisp, School of Education,
Oregon State University

WHAT IS THE PURPOSE OF THIS STUDY?

You are being invited to take part in a research study designed to 1) Examine the effect of text messaging as a way for teachers to communicate with parents and students; 2) Evaluate the role consistent communication between teachers, students, and parents will have on academic achievement, 3) Examine the relationship between school communication and student academic performance; and 4) The outcomes of this research are intended to be used for a Ph.D. dissertation in the Department of Education at Oregon State University. It is anticipated that the data gathered as a result of this study will be published in an academic journal and conference presentations. Any interested party including participants of study, school administration, teachers, students, and parents will have open access to the results of the study.

We are studying this because there is evidence that suggests barriers to communication between teachers, parents, and students. By utilizing mobile forms of communication, this study will confront traditional barriers of communication and evaluate the role technology can play improving communication and student academic success.

WHAT IS THE PURPOSE OF THIS FORM?

This consent form gives you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask any questions about the research, the possible risks and benefits, your rights as a volunteer, and anything else that is not clear. When all of your questions have been answered, you can decide if you want to be in this study or not.

WHY AM I BEING INVITED TO TAKE PART IN THIS STUDY?

You are being invited to take part in this study because you are a **parent** of a student in a high school.

WHAT WILL HAPPEN DURING THIS STUDY AND HOW LONG WILL IT TAKE?

Parents who agree to participate in the research experiment will receive text messages on their cell phones sent from a teacher. The teacher will send approximately 2 messages a week to parents. The text messages will be general reminders of assignments, class activities, or tests. The text message will not be “customized or unique” messages targeting individual parents but will be “bulk” messages sent to entire groups of parents.

Parents and students will receive text messages after school classes have ended. Text messages will be sent to parents and students between 2:45pm and 8:00pm.

If you agree to take part in this study, your involvement will last for **approximately 12 weeks** during the fall semester of the 2007-2008 school year. Over a 12-week period, students and parents will randomly receive text messages from the student’s teacher about class related assignments.

There will be one follow up meeting at the conclusion of the study to take place in March of 2008. The meeting will be approximately 30 minutes in length. Specific date is to be determined.

WHAT ARE THE RISKS OF THIS STUDY?

There are no major risks associated with this study. There are indirect risks associated with the technology required for the study. The teacher will be sending the text messages from a computer with an Internet connection. Secure transmission of text messages via the Internet cannot be guaranteed to be secure or error-free as information could be intercepted, corrupted, lost, or destroyed.

WHAT ARE THE BENEFITS OF THIS STUDY?

You will benefit from being in this study. By participating in this study, the student and parent will be provided with data that demonstrates how communication has a direct relationship to student assignment completion. This study will provide evidence showing the impact of mobile communication between teachers, parents and students. We hope that, in the future, other people might benefit from this study because of the evidence provided demonstrating the need for school systems to modernize their communication systems in order to have consistent and reliable contact with students and parents.

WILL IT COST ME ANYTHING TO BE IN THIS STUDY?

There is no direct cost to participate in the research experiment.

There may be a small charge for parents and students to receive a text message on a cell phone. Check with your cellular plan for details. Usually, the cost to receive a text message is minimal \$0.05 to \$0.10 per text message received.

WILL I BE PAID FOR PARTICIPATING?

You will not be paid for being in this research study.

WHO WILL SEE THE INFORMATION I GIVE?

The information you provide during this research study will be kept confidential to the extent permitted by law. To help protect your confidentiality, we will use identification code numbers or symbols to identify parents and students. If the results of this project are published your identity will not be made public.

DO I HAVE A CHOICE TO BE IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. If you decide not to take part in this study, your decision will have no effect on the instruction you receive in class.

You will not be treated differently if you decide to stop taking part in the study. If you choose to withdraw from this project before it ends, the researchers may keep information collected about you and this information may be included in study reports.

TERMINATION OF STUDY BY INVESTIGATOR/SPONSOR

Under certain circumstances, your participation in this research study may be ended without your consent. This might happen because student disciplinary problems, parent and (or) student request, student and (or) parent relocation, or student “drops” class.

WHAT IF I HAVE QUESTIONS?

If you have any questions about this research project, please contact: Matthew Scott Crisp, 541-598-4452, crispm@onid.orst.edu, or Dr. Linda Samek, Lsamek@corban.edu, 503-589-8155

If you have questions about your rights as a participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator, at (541) 737-4933 or by email at IRB@oregonstate.edu.

Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

PARENT/(Guardian)

Participant's Name (printed)

PARENT/ (Guardian) Signature of Participant
(Date)

Name of Child

Appendix M Informed Consent Document for Teachers



College of Education

210 Education Hall, Corvallis, Oregon 97331-3502
T 541-737-4661 | F 541-737-8971 | <http://oregonstate.edu/education>

INFORMED CONSENT DOCUMENT: TEACHERS

Project Title: Modernizing School Communication Systems

Principal Investigator: Dr. Linda Samek, OSU adjunct professor,
School of Education

Co-Investigator(s): Matthew Scott Crisp, OSU School of Education

WHAT IS THE PURPOSE OF THIS STUDY?

You are being invited to take part in a research study designed to 1) Examine the effect of text messaging as a way for teachers to communicate with parents and students; 2) Evaluate the role consistent communication between teachers, students, and parents will have on academic achievement, 3) Examine the relationship between school communication and student academic performance; and 4) The outcomes of this research are intended to be used for a Ph.D. dissertation in the Department of Education at Oregon State University. It is anticipated that the data gathered as a result of this study will be published in an academic journal and conference presentations. Any interested party including participants of study, school administration, teachers, students, and parents will have open access to the results of the study.

We are studying this because there is evidence that suggests barriers to communication between teachers, parents, and students. By utilizing mobile forms of communication, this study will confront traditional barriers of communication and evaluate the role technology can play improving communication and student academic success.

WHAT IS THE PURPOSE OF THIS FORM?

This consent form gives you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask any questions about the research, the possible risks and benefits, your rights as a volunteer, and anything else that is not clear. When all of your questions have been answered, you can decide if you want to be in this study or not.

WHY AM I BEING INVITED TO TAKE PART IN THIS STUDY?

You are being invited to take part in this study because you are a **teacher** in a high school (grades 9-12). Your participation in this study requires that you send text messages to students and parents from the keyboard of a computer (via email) to the cell phones of parents and students.

WHAT WILL HAPPEN DURING THIS STUDY AND HOW LONG WILL IT TAKE?

Teachers who agree to participate in this study will be asked to send text messages to parents and students twice a week and track the progress of student work on using a the school issues grade book program.

The parents and students who agree to participate in the research experiment will receive text messages on their cell phones sent from a teacher. The text messages will be general reminders of assignments, class activities, or tests. The text message will not be “customized or unique” messages targeting individual students but will be “bulk” messages sent to entire groups of students and (or) parents.

Parents and students will receive text messages after school classes have ended. Text messages will be sent to parents and students between 2:45pm and 8:00pm.

If you agree to take part in this study, your involvement will last for **approximately 12 weeks** during the fall semester of the 2007-2008 school year. Over the 12-week period, **each student and parent will be exposed to all 4 different treatments**. The treatment is the text message and type of audience that will receive the text message.

Treatments | audience

Treatment 1 = **students** receive text message

Treatment 2 = **parents** only receive text message

Treatment 3 = **parents AND students** receive text message

Treatment 4 = text message (general-non assignment related) sent to parents and students

There will be one follow up meeting at the conclusion of the study to take place in early March 2008. The meeting will be approximately 30 minutes in length. Specific date is to be determined.

WHAT ARE THE RISKS OF THIS STUDY?

There are no major risks associated with this study. There are indirect risks associated with the technology required for the study. The teacher will be sending the text messages from a computer with an Internet connection. Secure transmission of text

messages via the Internet cannot be guaranteed to be secure or error-free as information could be intercepted, corrupted, lost, or destroyed.

WHAT ARE THE BENEFITS OF THIS STUDY?

You will benefit from being in this study. By participating in this study, the teacher, student, and parent will be provided with data that demonstrates how communication has a direct relationship to student assignment completion. This study will provide evidence showing the impact of mobile communication between teachers, parents and students. We hope that, in the future, other people might benefit from this study because of the evidence provided demonstrating the need for school systems to modernize their communication systems in order to have consistent and reliable contact with students and parents.

WILL IT COST ME ANYTHING TO BE IN THIS STUDY?

There is no direct cost for teachers to participate in the research experiment.

WILL I BE PAID FOR PARTICIPATING?

You will not be paid for participating in this research study.

WHO WILL SEE THE INFORMATION I GIVE?

The information you provide during this research study will be kept confidential to the extent permitted by law. To help protect your confidentiality, we will use identification code numbers or symbols to identify parents and students. If the results of this project are published your identity will not be made public.

DO I HAVE A CHOICE TO BE IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. If you decide not to take part in this study, your decision will have no effect on the instruction you receive in class.

You will not be treated differently if you decide to stop taking part in the study. If you choose to withdraw from this project before it ends, the researchers may keep information collected about you and this information may be included in study reports.

TERMINATION OF STUDY BY INVESTIGATOR/SPONSOR

Under certain circumstances, your participation in this research study may be ended without your consent. This might happen because of principal request, technology related errors, inconsistent implementation of study/sending text messages to students and parents, not following research experiment directions, or your position as a full time teacher ends during the course of the study.

WHAT IF I HAVE QUESTIONS?

If you have any questions about this research project, please contact: Matthew Scott Crisp, 541-598-4452, crispm@onid.orst.edu, or Dr. Linda Samek, lsamek@corban.edu, 503-589-8155

If you have questions about your rights as a participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator, at (541) 737-4933 or by email at IRB@oregonstate.edu. Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

TEACHER Participant's Name (printed)

TEACHER Signature of Participant

Date

Appendix N Principal Letter of Approval to Conduct Study (Site 1)

Bend Senior High School
Mark Neffendorf, Principal
230 NE 6th Street
Bend, Oregon 97701
541- 383-6290

Human Protections Administrator
Office of Sponsored Programs and Research Compliance
312 Kerr Administration Building
Corvallis, Oregon 97331-2140
541-737-4933

June 25, 2007

This letter is written on behalf of Matthew “Scott” Crisp, a social studies teacher at Summit High School in Bend, Oregon and PhD student in teacher leadership at Oregon State University. I understand that consent is required by the IRB in order to conduct a university-sponsored research experiment.

This letter is to verify my support of Scott’s experiment to take place at Bend Senior High School during the 2007-2008 school year. Scott’s experiment will test the effectiveness of text messaging to improve communication between teachers, parents, and students. His research will require the efforts of two teachers at Bend Senior High School to send text messages from a computer to the cell phones of parents and students.

The research experiment involves teachers sending one-way (no reply) text messages from a computer to the mobile phones of parents and students. These messages will consist of assignment and classroom activity reminders. The goal of the research will be to evaluate if text messaging has a direct impact on student assignment completion rate.

Again, I give permission for Scott to complete his research during the 2007-2008 school year at Bend Senior High School. If you have any questions, please contact me at (541) 383-6290.

Sincerely,

Mark Neffendorf
Principal, Bend Senior High School

Appendix O Principal Letter of Approval to Conduct Study (Site 2)

Summit High School
Dr. Lynn Baker
2455 NW Clearwater Drive
Bend, Oregon 97701
541-322-3300

Human Protections Administrator
Office of Sponsored Programs and Research Compliance
312 Kerr Administration Building
Corvallis, Oregon 97331-2140
541-737-4933

June 25, 2007

This letter is written on behalf of Matthew “Scott” Crisp, a social studies teacher at Summit High School in Bend, Oregon and PhD student at Oregon State University. I understand that consent is required by the IRB in order to conduct a university-sponsored research experiment.

This letter is to verify my support of Scott’s experiment to take place at Summit High School during the 2007-2008 school year. Scott’s experiment will test the effectiveness of text messaging to improve communication between teachers, parents, and students. His research will require the efforts of two teachers at Summit High School to send text messages from a computer to the cell phones of parents and students.

The research experiment involves teachers sending one-way (no reply) text messages from a computer to the mobile phones of parents and students. These messages will consist of assignment and classroom activity reminders. The goal of the research will be to evaluate if text messaging has a direct impact on student assignment completion rate.

Again, I give permission for Scott to complete his research during the 2007-2008 school year at Summit High School. If you have any questions, please contact me at (541) 322-3300.

Sincerely,

Dr. Lynn Baker
Principal, Summit High School

Appendix P Superintendent Letter of Approval to Conduct Study

Bend La Pine School District
Dr. Doug Nelson, Superintendent
520 NW Wall Street
Bend, Oregon 97701

Human Protections Administrator
Office of Sponsored Programs and Research Compliance
312 Kerr Administration Building
Corvallis, Oregon 97331-2140
Telephone: 541-737-4933
Fax: 541-737-3093

June 25, 2007

This letter is written on behalf of Matthew “Scott” Crisp, a social studies teacher at Summit High School in Bend, Oregon and PhD student at Oregon State University. I understand that consent is required by the IRB in order to conduct a university-sponsored research experiment.

This letter is to verify my support of Scott’s experiment to take place in the Bend La Pine School District. The specific research sites will consist of Bend Senior High School and Summit High School. Scott’s experiment will test the effectiveness of mobile messaging to improve communication between teachers, parents, and students. His research will employ the efforts of four regular education teachers and approximately 260 subjects (parents and students).

The research experiment involves teachers sending one-way (no reply) text messages from a computer to the mobile phones of parents and students. These messages will consist of assignment and classroom activity reminders. The goal of the research will be to evaluate if text messaging has a direct impact on student assignment completion rate.

Again, I give permission for Scott to complete his research during the 2007-2008 school year. If you have any questions, please contact me at (541) 383-6000.

Sincerely,

Dr. Doug Nelson
Superintendent, Bend La pine School District

Appendix Q Letter to Parents Describing Research Study



College of Education

210 Education Hall, Corvallis, Oregon 97331-3502

T 541-737-4661 | F 541-737-8971 | <http://oregonstate.edu/education>

Dear Parent or Guardian:

Teacher communication with parents is important to student success in school. I am asking for your help in determining the effect of assignment completion if teachers send text messages to your cell phone about your son/daughter's school assignments. By participating in this study, you will benefit from increased communication from teachers in regards to your son/daughter's school assignments. Your participation is extremely valued. Your participation in this study is voluntary. You will not be at a disadvantage if you do not participate in this study.

The information you provide on the parent information sheet will be kept confidential to the extent permitted by law. There are no foreseeable risks to you as a participant in this project. I would appreciate it if you would take about 20 minutes to respond to the enclosed Informed Consent. If interested in participating in this study, please review and sign the Informed Consent form and also the fill out Parent Information sheet. Please mail back to me in the envelope provided.

In order to participate in the study, BOTH the parent and child (student) need to agree to terms of study. Your son or daughter has been provided with appropriate forms to sign.

If you have any questions about the survey, please contact Matthew Scott Crisp at (541) 598-4452 or by email at crispm@onid.orst.edu. If you cannot reach me directly, please contact Dr. Linda Samek at 503-589-8145 or by email at LSamek@corban.edu. If you have questions about your rights as a participant in this research project, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator at (541) 737-4933 or by email at IRB@oregonstate.edu.

Thank you for your help. I appreciate your cooperation.

Sincerely,

Matthew Scott Crisp

Summit High School Teacher and OSU Phd student

Appendix R Teacher 1 TM Interventions

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | A | | | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | | |

Text message #1: "Biology-A#22, Voc. p. 204
SA p. 207, Ch. 7 Assessment p. 217 #'s 3-6, & 15 - 17WKST - SR 8-1 & 8-2,
Due - Wednesday 10/07/07"

Text message #2: "Biology-A#23 Voc. p. 208, SA p. 214
WKST - GR Ch. 8, Due - Thursday 10/18/07"

Text message #3: "Biology-A#25, Voc. pg. 221, SA pg. 225
Ch. 9 Assessment pgs. 237 #'s 1-6, 11-19
Due - Wednesday 10/24/07"

Text message #4: "Biology-A#27
WKST - GR Ch. 9, Issues in Biology pg. 233
Due - Monday 10/29/07"

Text message #5: "A#28
Chapter 9 Practice Test
Due - Tuesday 10/30/07"

Text message #6: "A#30
Voc. p. 244, SA p. 249
Chapter 10 Assessment p. 257 #'s 5-7 & 15-21
Due - Friday 11/2/07"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | B | | | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | | |

Text message #1: "A#32, Voc p. 250, SA pg. 252, Lab pgs. 254 & 255
Due - Tuesday 11/6/07"

Text message #2: "A#33
Ch.10 Practice Test
Wed 10/7/07"

Text message #3: "A#1
Voc. p. 263, SA p. 266
Ch. 11 Assessment pg. 283 #'s 1, 22, & 23
Due - Wednesday 11/14/07"

Text message #4: "A#3
WKST - Dihybrid Crosses
Due - Friday 11/16/07"

Text message #5: "A#7 Voc. p. 275 SA p. 278
Ch. 11 Assessment pg. 283 #'s 7-9, 16, & 18-19
Due - Thursday 11/29/07"

Text message #6: "A#8
Chapter 11 Practice Test
Due – Friday 11/30/07"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | C | | | |
| Weeks 10-12 | | | | |

Text message #1: "A#9
 Voc. p. 287, SA p. 294
 Ch. 12 Assessment p. 315 #'s 1-3, & 11-14
 Due - Wednesday 12/4/07"

Text message #2: "A#10
 Lab - DNA
 Due - Monday 12/10/07"

Text message #3:" A#11
 Voc p. 295, SA p. 299
 Ch. 12 Assessment p. 315 #'s 4-6 & 15 - 17
 Due - Tuesday 12/11/07"

Text message #4: "A#12
 WKST 12 -3
 Due - Wednesday 12/12/07"

Text message #5: "A#15
 Create a Ch. 12 Crossword
 Due - Wednesday 12/19/07"

Text message #6: "A#16
 Cloning paper
 Due – Friday 12/21/07"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | D | | | |

Text message #1: "B#1 Read material for chapter 10. We will discuss cell creation"

Text message #2: "B#4 Create Crossword from chapter 10. We will review in class"

Text message #3: "B#5 Paper/paragraph on topic of choice. We will review in class and have class discussion"

Text message #4: "B#6, Voc. p. 323
Come to class prepared to answer questions relating to vocab"

Text message #5: "B#8 Voc 1-33. We will have a class discussion to measure your knowledge of voc and complete a class activity."

Text message #6: "B#9 complete questions 1-10 from chapter 11"

Appendix S Teacher 2 TM Interventions

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Text message #1: "J. Rankin reading/questions due Tues"

Text message #2: "Due Tomorrow- Completed Abrams case handout, pages 390-395 Timeline"

Text message #3: "Read Section 1 on the Roaring 20s. Answer guided reading w/s, due tomorrow"

Text message #4: "Don't forget to read pages 426-431 and complete the Reading St. Guide"

Text message #5: "Porgy and Bess research assignment. 3-4 sentence plot summary + analysis"

Text message #6: "Read Pages 468-473, complete timeline 10 events"

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Text message #1: "Second Quarter begins Tuesday! We'll finish "Cinderella," and then
dive into FDR's New Deal recovery phase"

Text message #2: "What does FDR do to pull America out of the Abyss?
Alphabet Soup, of course. Closer look at the federal relief agencies tomorrow"

Text message #3: "Hello All! Get ready for an assessment covering our New Deal Readings. We'll be chipping away at our New Deal Political Cartoon"

Text message #4: "Hey All! We're wrapping up the New Deal tomorrow and plugging away at our Political cartoon project"

Text message #5: "A bomb in class essay tomorrow. Students need to write thesis and outline tonight"

Text message #6: "After a sluggish start, we're back at it tomorrow with an investigation on the Pearl Harbor disaster"

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Text message #1: "Japanese Internment debate just started it. Now the Atomic Bomb! Homework is pages 598-605 + 15 event timeline"

Text message #2: "Cold War gets frosty! Guided Reading for pages 626-631 due today!"

Text message #3: "Good Morning. I'm hoping that last night you were able to complete the reading and vocab (pages 642-649). These people/topics will be critical in understanding the Rosenberg Case and debate"

Text message #4: "Moving up to the Vietnam War. Complete the Guided Reading Hand Out for pages 632-639"

Text message #5: "Book club reviews and selections as well as the Vietnam War Wednesday. Read Pages 674-679 and complete DBQ questions on pages 694-695"

Text message #6: "OK Non-conformists! What to do about the Vietnam War? Guided reading 17.2 due tomorrow"

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Text message #1: "Students are studying in the middle of the 60's. They are to read 18.1 and complete the Guided reading and music lyrics research. Due tomorrow"

Text message #2: "Women's Rights movement picks up. Students are reading and outlining pages 813-819. Due tomorrow"

Text message #3: "Students need to rewrite the Nixon essays for homework tonight. Typed, double spaced and get ready for peer editing tomorrow"

Text message #4: "Your students are learning about the frustration of the 1970s, Ford and Carter. Please share your personal experiences of period with them. They need to read and outline 863-870 in the text"

Text message #5: "Reagan saves the day- reading is 20.2 and 20.3 and your students should complete Guided Reading handouts"

Text message #6: "Wed. am deadline for make up work and movie permission slips. Textbooks due Thurs. to avoid fines"

Appendix T Teacher 3 TM Interventions

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | C | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | | |

Text message #1: "Due Thursday: p. 349 #14,15,17,18,20-23,28-37,42-47,52 and wkst D-27,28"

Text message #2: "Due Friday: p. 356 #13-25 odd, 26-37, 40, 41"

Text message #3: "Ch. 6 Review p.361 #27-57 and p.402 #27-30"

Text message #4: "Green Book p. 2-25 to 2-31"

Text message #5: "p. 385 #13-29 odd, 30-36 due Tuesday"

Text message #6: "Chapter 6 Review for test tomorrow p. 399 #7-26"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | A | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | | |

Text message #1: "Due Wednesday: p. 421 #14-37"

Text message #2: "Due Wednesday p. 455 #13-41 odd"

Text message #3: "Ch. 8 review: p. 464 #11-28,44-69; p.455 #40; p.447 #38; p.441 #31"

Text message #4: "Due Tuesday: p. 478 #48-61 and p. 484 #16-29"

Text message #5: "Due Wednesday: p. 484 #30-39 and Worksheet 9-2 #1-22"

Text message #6: "Due Thursday: p. 493 #17-34, 37-51"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | D | |
| Weeks 10-12 | | | | |

Text message #1: "Don't forget to look for a GCF!"

Text message #2: "We are reviewing for the test on Monday December 10th"

Text message #3: "We have started a unit on Quadratic and Exponential functions"

Text message #4: "study chp work, clue-negative b, negative b, plus or minus square root, plus or minus square root, b squared minus..."

Text message #5: "We have begun working with exponential functions"

Text message #6: "We will be covering advanced exponential functions plus reading math"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | B | |

Text message #1: "Due Thursday: p. 764 # 14-21, 30-35, 69-71 and 3 overhead problems"

Text message #2: "Due Friday: p. 773 # 16-27,32-35,48-51"

Text message #3: "Due Thursday: p. 651 #24-41"

Text message #4: "Due Tomorrow: p. 657 #12-31,49-51"

Text message #5: "Due Tuesday p. 675 #14-41, 53-61"

Text message #6: "Due Thursday: p. 697 #11-24, 29-34 (Study Hard!!)"

Appendix U Teacher 4 TM Interventions

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | D |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | | |

Text message #1: "Today we wrap up the 1920s and start the Depression tomorrow"

Text message #2: "Today we read letters to FDR during the Depression. Tomorrow we go to the library to type our memos"

Text message #3: "Today we read about the New Deal programs in Chapter 10. Tomorrow we go to the library to type our memos"

Text message #4: "Tomorrow we will have a Socratic Seminar discussion of what the role of government should be in the economy with regard to 7 different topics"

Text message #5: "Today we finished the 20s and 30s and started our WWII unit. Tomorrow I will be handing out rubrics for our big unit notebook"

Text message #6: "We start our Japanese Internment storyline today"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | | C |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | | |

Text message #1: "Hello Parents. Tonight, students need to go online to gather more info on Japanese internment for our storyline activity. Make up work for quarter grades due tomorrow a.m."

Text message #2: "Tmrw Jap. Intern. Storyline ends. I'll collect 6 journal entries and character drawing. Pls. check with student to make sure he/she has it complete tonight and make up missed entries"

Text message #3: "Tonight students need to outline Ch. 11, Sec. 3. Due tomorrow"

Text message #4: "Tonight, students should read pg. 614-615 and write a 1 paragraph summary by tomorrow we kick off A-Bomb project"

Text message #5: "Major point week! Study guide notes for WWII test due Wed. A-bomb project culminates in debate on Thurs., essay on Fri."

Text message #6: "Make sure to get a presentation board by Wed pm"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | | B |
| Weeks 10-12 | | | | |

Text message #1: "Remember to take notes on Chapter 14, Sec. 2 and 3 by tomorrow. And get/make your poster board"

Text message #2: "Tonight: Cold war study guide Ch. 13, Sec. 1 & 2"

Text message #3: "Finish your study guide for the Cold War tonight"

Text message #4: "Jim Crow web-worksheet due tomorrow. Go to library if you don't have Internet"

Text message #5: "Civil Rights study guide notes are due Friday am"

Text message #6: "Complete civil rights questions sec 2"

| | Teacher 1 | Teacher 2 | Teacher 3 | Teacher 4 |
|----------------|--------------|--------------|--------------|--------------|
| Weeks 1-3 | | | | |
| Weeks 4-6 | | | | |
| Weeks 7-9 | | | | |
| Weeks 10-12 | | | | A |

Text message #1: "Today was last day of class research for race relations essay. I'll be checking research notes on Friday"

Text message #2: "Students need to finish outline for race relations essay by tomorrow. Remember, thesis needs 3 parts"

Text message #3: "Vietnam Debate roles were assigned. Read and highlight packet by tomorrow"

Text message #4: "Nixon takes us out of the 60's! Buckle up for a Bumby ride. Students need to read chapter 19.1 and complete the corresponding Guided Reading"

Text message #5: "Last history notebook due Tues. Big points"

Text message #6: "Students need to show progress on their timeline project by having 30 1-sentence event summaries by tomorrow"

Appendix V Open-ended Responses Provided by Students

Responses below are from anonymous student participants who elected to provide comments concerning teachers using text messaging as a form of communication about school assignments. Comments were collected from students at the conclusion of the experimental phase of this study.

"The txt messages actually help especially since I was traveling a lot. I would get the txt and do my homework. Thanks!"

"I liked having the text as a reminder but at sometimes it got to be obnoxious. It was a good reminder and reference for my homework."

"I liked it because it helped me to complete my homework. It was a good reminder and I wish every teacher did the texting. It was kind of annoying when my mom was getting the texts because she would nag me about homework when I already knew about it."

"But when I did get them I think they helped remind me a lot to get started on it."

"I got text through my parents phone which was not my best interest but it helped because if I forgot to do my homework of course my parents were there to get on my case. My parents also liked it because they knew I was getting homework every night."

"The texts were nice reminders, sometimes I didn't notice I had one but it worked out nicely and I would probably do it again if I had the device. My parents would sometimes get them and it was sort of annoying having them grill me about doing my homework."

"Some of the text messages were beneficial but some were only annoying. When my parents also received the messages they got confused and asked me about them. That caused discussion and was beneficial. However, sometimes the messages had no effect on me what so ever. Barely noticed them half the time."

"It really helped me remember what was due."

"The texts did not really affect me but I enjoyed receiving them and they did help re-affirm that I did the right assignment. I think that the text being sent to parents is helpful too because my mom has asked me more than once whether I had a specific assignment done from History. It helps parents get involved with their kids and it helps kids remember their assignments. It also eliminates the excuse 'I did not know.'"

"The texting study was helpful. It reminded me to do my homework, at least for history. I didn't know that my mother even noticed that she was getting texts, she didn't say anything about it. It was an easy, simply and effective way to stay on top of my work."

"The texting at the beginning of the year helped me greatly keep up in the History class. Overall I had a good experience with the study."

"It helped remind me what was coming up in the class, or what the homework was. When I stopped getting the text messages I noticed I started to fall behind."

"The text messages were helpful reminders but by the time I got them I already did the assignment or reading. They got annoying after a while."

"I am very forgetful so when we were assigned a homework assignment we were texted to show us what it was. It helped me remember my assignments. Also if I missed a day even though I wasn't there for class students should receive text messages from each class to inform them of assignments."

"During the three months that we got the text messaging I personally thought that they were a great help with remembering the homework assignments. I wish that all of my teachers did that because personally I felt better about myself by keeping up on my homework. This was so much fun, and I am very glad I was able to be apart of this study."

"The texting study was very helpful to me. At first I got them almost everyday, but near the end I almost never got them. My mom kept getting them though. It helped because my mom and I could interact on what the homework as. The most helpful time was probably around 6pm."

"Good, it reminded me to do my homework. Bad, Not all kids have cell phones."

"I think the study would have been more effective if the text were received later at night. Sometimes I would get the text right after school. If we got the text later at night, it would probably be more effective. Overall, it helped me remember my homework."

"Getting text messages did not change my homework habits, although it was helpful when I was absent. I knew what the homework was..."

"Pros: if you were absent it helped. Gave a heads up. Cons: I did most of my homework in class. If I didn't finish my books were at school."

"It didn't make a huge impact because I always finish my homework in class. But it was helpful when I missed school."

“It was weird getting text messages from my teacher. I did my homework in class so it did not matter.”

“The study with texting everybody the homework after school was helpful for me only when I missed a day. When the teacher put the homework on the white board, I just wrote it down in my agenda. What would be an alternative for this method is to text the people that were not in class that day. This way nobody is charged for receiving a text (if they do get charged) for something they don't need.”

