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The student-teacher relationship in a one-to-one technology classroom: a case study

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THE STUDENT-TEACHER RELATIONSHIP IN A ONE-TO-ONE TECHNOLOGY CLASSROOM: A CASE STUDY

by
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Dedication

This work is dedicated to the two most influential educators in my life, my mother Ellen D. Higgins and my father, the late Peter B. Higgins III. Throughout my life, their ability to allow me to succeed and fail has taught me the true value of learning and what it means to be a teacher, coach, and mentor.

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Abstract

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This embedded case study explores the student-teacher relationship in a one-to-one technology environment. The actual change in relationship from the traditional classroom to a one-to-one classroom was examined. The author considered the perspective of four classroom teachers and 207 high school students at a suburban public high school in New Jersey. The case study research utilized teacher interviews, classroom observations, student surveys and a student focus group. The author uses the self-system theory of motivation, and the three characteristics of autonomy, relatedness and competency, as a theoretical framework. The research determined that there was a notable change in the relationship between teachers and students within the one-to-one environment. The change existed in the connectivity of the teachers and their students beyond the classroom and school. The researcher concluded that teachers and their students do have a positive relationship in a one-to-one environment and that relationship depends on the ability of the teachers to engage students using the one-to-one device. The researcher concluded that the one-to-one environment creates an autonomous learning environment for students, teachers and students, have a relatedness that extends beyond the traditional boundaries of a school, and a higher level of competency in both teachers and students creates a more engaging classroom. As one-to-one technology environments are becoming more popular across the country; this study will help to identify expected changes in the teacher/student relationship before issues occur.

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Chapter One

Introduction

Background

In 1983, schools averaged one computer for every 125 students. That number increased to one for every nine in 1995, and one for every six in 1998 (Russell, Bebell, Cowan and Corbelli, 2002). Over the past decade and a half, schools have been flirting with one-to-one programs in which every student is issued his or her own computer for educational purposes. This endeavor has proven costly, forcing districts to experiment with other devices like laptops and tablets (Wilson & Peterson 2006; Bain & Weston, 2012)

A significant program utilizing one-to-one technology is the Maine Learning Technology Initiative (MLTI). In the fall of 2002, every seventh grader in the state of Maine received his or her individual laptop to be used for instruction and support education (Garthwait & Weller, 2005). The idea was that the one-to-one learning environment would improve learning for those students and then in turn the program would be expanded to other students throughout the state (Beaudry, 2004; Fairman, 2004; Garthwait & Weller, 2005; Harris & Smith, 2004; Silvernail & Lane, 2004). Years later, the program has continued with great success and many lessons learned. However with technology education changing rapidly, one lesson learned is that one-to-one programs need to adapt and evolve as well (Garthwait & Weller, 2005).

Technology in schools is continuously changing. In December (2005), Tom March wrote, “to counteract the new WWW (whatever, whenever, wherever) potentially harmful impact on youth, education must use technology to create learning experiences

that are real, rich, and relevant." Nine years later education is still trying to get a grasp how to teach our students in a world where they can get anything they want whenever and wherever they need it. One-to-one programs are a solution to the problem of teaching students to be successful in a whatever, whenever, wherever world (Warchauser, 2005).

School districts throughout the United States have adopted one-to-one programs in order to teach students 21st century learning skills, encourage greater engagement through multi-media programs, improve writing, deepen learning and more easily integrate technology into instruction (Warchauser, 2005). In studying one-to-one programs in Maine and California, Warchester determined the laptop programs would not cause an increase in test scores, reform troubled schools, or erase the achievement gap; but the one thing the program will do is foster greater collaboration between the teacher and student. This case study does not look at how a one-to-one program affects student achievement; it does however explore the relationship between the teachers and the students in a one-to-one environment. It is in this area where there is a gap in research. There is very little research at all on the impact of a one-to-one program on the students-teacher relationship.

In 2011, Suburban Public High School (SPHS), New Jersey instituted a one-to-one program utilizing Apple iPad devices. Each SPHS student in grades 9-12 was provided with an iPad to be used as a learning tool in and out of the classroom. The iPad is used for classwork and homework to communicate, collaborate, research, read, take notes and explore new digital content (Monroe Township, 2011). IPads were chosen over laptops because of the mobility of the device, the broad range of applications designed

for the device, and the technical support and professional development that came with the program from the Apple Company.

As an administrator at SPHS, I observed that the initiative was to some an exciting new adventure, while others it was a frightening unfamiliar experience. The most obvious difference in anticipation was between the teachers and students. Collectively, the students anticipated the program with greater enthusiasm than the teachers. In the fall of 2011, the teachers and students were given an iPad, simple instruction on how to use them, and encouragement to explore the educational possibilities associated with the device. During the first year of implementation, the teachers and the students were given formal training on how to use the iPad to drive instruction.

From the beginning, it was obvious that the students were more capable and comfortable with the technology as compared to the teachers. Moreover, it was evident that the classroom roles of both the teacher and student were changing. This research will explore the relationship between the teachers and the students within the one-to-one program at SPHS.

There is an importance to this study that is far reaching. As will be discussed in the Statement of The Problem, there are many studies conducted on one-to-one programs (Beaudry, 2004; Fairman, 2004; Garthwait & Weller, 2005; Harris & Smith, 2004; Lane, 2003; Mouza, 2008; Ross & Rosenberg, 2007; Silvernail & Gritter, 2007; Silvernail & Lane, 2004; Warchauser, 2006) and there are some studies on student-teacher relationships (Avenilla, 2003; Connell & Wellborn, 1991; Lynch & Cicchetti, 2002; Newman, 2000; Newman, 2002; Peirson & Connell, 1992; Reeve, Jang, Carrel, Jeon & Barch, 2004; Rimm-Kaufman, 2012; Wellborn, 2013). However, thus far no particular

study that explores the students-teacher relationship within a one-to-one setting. Monroe has presented me the opportunity to investigate this topic firsthand because of the school-wide one-to-one program initiative.

Implications of this study will be felt within the school itself, leading to an understanding of the relationship between students and teachers. Ideally, the findings of this study will also lend to the fabric of both the student-teacher relationship and technology implementation in all schools. Ultimately, the findings will impact the way schools and districts across the country go about implementing one-to-one programs and training their teachers for successful classroom use.

Conceptual Underpinnings of the Study

When building a conceptual framework, it became apparent that there was no theory that supports the student-teacher relationship within the one-to-one environment. Therefore, it was necessary to rely on literature to construct the structure of the research and use the empirical evidence of the qualitative study to develop the concepts. Maxwell (2004) contends:

> The conceptual framework for your research study is something that is constructed, not found. It incorporates pieces that are borrowed from elsewhere, but the structure, the overall coherence, is something that you build, not something that exists ready-made. It is important for you to pay attention to the existing theories and research that are relevant to what you plan to study, because these are often key sources for understanding what is going on with these phenomena. (p. 35)

As the researcher, it was important to create a framework that encompassed the

one-to-one environment, as well as the student-teacher relationship and join the two together to create a new conceptual idea. Yin (2013) builds on this concept by describing the search for a conceptual framework as a search for concepts or "ideas that are more abstract than the actual data in an empirical study" (p. 93). Consequently, the framework was developed taking into account the culture of the school, the groups of people involved, and the overall organization of the school district and community. A concept map, (Appendix A) shows the genesis of ideas of motivation, competence, and autonomy, which is congruent with the tenets of the self-system theory of motivation.

The self-system theory of motivation professes that students are motivated at a greater level when three distinguishable elements are apparent: *autonomy*, *relatedness*, and *competency* (Connell & Wellborn, 1991; Harter, 1983; Pierson & Connell, 1992; Wellborn, 2013). By using the self-system theory as a framework, it is possible to create a research model that addresses the key areas of interest, investigating relationships between them.

The basic fundamentals of the self-system theory are used to emphasize autonomy, relatedness and competency in a person throughout their childhood and adolescence. The seminal work found in the Handbook of Child Psychology (Harter, 1983) has been used in relation to many areas of child and adolescent psychology. For instance, Newman (2002) identified the self-system theory in how students cope with academic difficulty in schools. Wellborn and Connell (1991) used Harter's work and applied the self-system theory to students in education. Wellborn (2013) defines the three needs of the self-system paradigm as students needing to be connected to the people

around them (relatedness), to be effectively successful at academics (competence), and experiencing educational endeavors that are personally relevant (autonomy).

The self-system theory is only one part to the theoretical framework looking at the student-teacher relationship in a one-to-one setting. The other two parts are obviously the relationship between the teachers and the students and the one-to-one environment itself.

The framework specifically addresses the way to measure the student-teacher relationship at the site of research by using two data collection tools developed from Gehlbach, Brinkworth & Harris' (2011) work on the development of student-teacher relationships at the secondary level, and Pianta's (1999) work with primary school students and their relationships with their teachers. Gehlbach, Brinkworth, & Harris developed a range of questions that could address a wide array of topics and subjects that are associated with secondary education.

Pianta, the foremost expert in student-teacher relationships developed his Student-Teacher Relationship Scale (STRS) to explore the teacher's perspective of the student-teacher relationship. The STRS measures patterns in terms of conflict, closeness, and dependency, attributes that are very similar to those of the self-system theory. Conflict is defined as a teacher feeling ineffective in the classroom, leading to a high rate of conflict with the students. Closeness is defined as the teacher's perceived positive relationship with the student with open communication and a source of support. Dependency is the level that a teacher perceives the student to be overly dependent on him or her.

In utilizing the self-system theory and the research of Pianta (1999) specifically, but also Gehlbach, Brinkworth, & Harris (2011), I have created a congruency between

the research. This determined to be helpful during data collection and analysis. Figure 1 depicts the relationship between the self-system theory and Pianta's work with STRS.

Figure 1

Relationship between the Self-System Theory and the Student-Teacher Relationship Scale

	Wellborn & Connell (1991)	**Pianta (1999)**
1st Dimension	Autonomy	Dependency
2nd Dimension	Relatedness	Closeness
3rd Dimension	Competency	Conflict

Statement of the Problem

Having access to a one-to-one environment and being involved in the implementation of a one-to-one program, I have observed many factors that would lead to the success or failure of a program. When having discussions with teachers during the implementation, a common theme that emerged was the changing relationship dynamic within the classroom. Many teachers adopted the one-to-one environment quickly while others fought the idea of releasing control of content development to the students. A paradigm shift began to occur and many questions began to take shape, one being how the relationship between teachers and students was going to change in the one-to-one program.

While one-to-one implementation is a reform trend in education, there is a lack of empirical studies of the one-to-one environment (Bebell & O'Dwyer, 2010; Li, 2010; Penuel, 2006). Penuel (2006) expounds by noting the existing knowledge of the research community about the one-to-one environment and its impact on student learning is not on par with the rapid expansion of technology education. Li (2010) goes as far as linking technology success to teacher involvement by stating, "changing teachers' perspectives about the value of an innovation is conducive to successful implementation" (p. 285) but stops short of exploring the value of student-teacher relationships.

Observing a one-to-one environment firsthand, allowed for deeper exploration into the success or failure of a program by focusing on the relationship between the students and teachers. There is an even greater lack of research into the relationship between the teachers and their students within the one-to-one environment. Existing studies explore the need for curriculum development (Garthwait & Weller, 2005), the effect on student engagement and attendance (Lane, 2004), or the technology access needed to support a one-to-one initiative (Hitchcock, 2001). Other studies have focused on specific subjects like Math and Science (Zucker & McGhee, 2005) or on special education (Hasselbring, 2001). The success of a one-to-one program does not rely on its outcomes but its sustainability, and the relationship between the teachers and students has a tremendous effect upon a program's sustainability (Pinkham & Johnson, 2013).

Purpose of the Study

The purpose of this study is to explore the idea of the teacher-student relationship paradigm in a one-to-one technology learning initiative. This embedded case study involves the exploration of four classrooms within a suburban public high school in

central New Jersey, a school that has initiated a school-wide, one-to-one learning initiative employing tablet devices as a learning tool. Specifically, the role of the teachers and the students was explored to determine if they perceived a change in their roles since the introduction of the iPad tablet. For the purpose of this study, the definition of change was relative to a switch from one existence to another. When the iPad was implemented into the curriculum, the relationship between the teachers and the students changed. Data gathered from this research will help the study site and other institutions by adopting such programs to better understand the impact of the iPad on the classroom environment. Furthermore, it will assist teachers and students to better understand their roles in a one-to-one setting.

The setting for this case study was a suburban public high school in New Jersey. The choice of this facility was based on the recent implementation of a school wide one-to-one digital environment and researcher access. Four teachers were selected to serve as participants within the school setting. Each teacher was randomly selected from a population of teachers who have experience in teaching and a perceived ability to use technology in the classroom.

Research Questions

Four research questions concerning the relationship between teachers and students in the SPHS one-to-one environment and how that relationship changed after the implementation of an iPad were explored. After extensive investigation, one overarching question emerged with four sub-questions.

1. How has the implementation of a one-to-one device for classroom instruction affected the student-teacher relationship?

a. What was the teacher's perception of the teacher-student relationship before the one-to-one implementation?

b. What was the teacher's perception of the teacher-student relationship after the one-to-one implementation?

c. What is the student's perception of the teacher-student relationship in the one-to-one setting?

d. Is the teacher's perception of the teacher-student relationship in alignment with the student's perceptions of the teacher-student relationship?

Limitations and Assumptions

As with all research this study has some initial limitations. One was the limited access to a one-to-one tablet setting. SPHS is a large high school with a one-to-one tablet initiative. However, a school with a similar program was undiscovered. As a result of the research, the setting of the boundaries is limited, and the findings are narrowed by time and setting to this particular case. This study does however, allow for future exploration of the subject at different levels.

Within the cases themselves, there are limitations and assumptions regarding the teachers studied. Teachers were randomly chosen from a pool of teachers with the following characteristics: the teacher works at SPHS, the teacher has taught more than five years at SPHS in order to speak to a relationship prior to and after the one-to-one implementation, and the teacher uses the tablet device for educational purposes. In addition, teachers who worked in the district for five years or less, and teachers who had an extended period of time on leave were removed. For example, a teacher on maternity

leave for the school year 2012-2013 was removed from the pool because her experience with the iPad in the classroom was not as rich as other participants given the gap of instructional time. All department heads were removed from the pool since they teach fewer classes and come in contact with fewer students throughout the day, thus diminishing the information-rich data. The pool of teachers was also limited to content area classes such as Math, Language Arts, Social Studies, World Language, and Special Education given that elective subjects used the iPad on a less than regular basis.

Some issues with the relationship between participant and researcher may have emerged as an obstacle to the research. As an administrator within the building, I naturally have a professional relationship with the participants that may have affected the research. Many measures were taken to avoid barriers such as using non-professional emails for communication purposes and creating an interview environment outside the teaching day. Interviews were also conducted at a place of the participants choosing to avoid any impropriety. Three of the four teachers requested their interviews occur in their classroom, the fourth chose to have the interview in a private office within the school building. In addition, the participants were assured they were not in anyway professionally responsible for their responses during interviews and their identities would be kept anonymous.

Organization of the Study

This study is organized into five chapters. The first chapter introduces the topic by providing the background narrative, conceptual framework, statement of the problem, purpose of the study with research questions, and possible limitations and assumptions. The second chapter of this study establishes context and provides a brief review of the

literature on topics associated with this study. Chapter three introduces the research design and methodology, population and sample, data collection and instrumentation, and statistical analysis methods. The fourth chapter is an overall analysis of data and an overview of the findings. Chapter five offers an overall summary of the study, and presents findings, conclusions, implications and ideas for further research

Chapter Two

Review of the Literature

Setting of the Study

The purpose of this embedded case study was to explore the idea of the teacher-student relationship paradigm in a one-to-one technology learning initiative. This case study involved the exploration of four classrooms within a suburban public high school in central New Jersey, a school that has initiated a school wide one-to-one learning initiative, employing tablet devices as a learning tool. Specifically, I explored the role of four teachers and their students who were allowed to participate in the study, to determine if they perceived a change in their roles since the implementation of the iPad tablet as a one-to-one device. For the purpose of this embedded case study, the definition of change is relative to a shift in behavior, from one behavior to another. When the iPad was implemented into the curriculum, the relationship between the teachers and the students changed. Data gathered from this research will help the study site and other institutions by adopting such programs to better understand the impact of the iPad on the classroom environment. Furthermore, it will assist teachers and students to better understand their roles in a one-to-one setting.

Due to the nature of this qualitative study and the techniques used, a literature review was necessary. The literature review was used to inform knowledge of the topics, demonstrate knowledge of the foremost research, and inform the reader of the topics being studied (Taylor, 2012). This chapter will investigate the one-to-one education movement in the United States. For the purposes of this study, the one-to-one

environment is defined as one providing students with a portable device with accessible productivity tools which can access the internet through wireless network capability and use the device to complete academic tasks like classroom collaboration and homework (Penuel, 2006).

This chapter will further explain the self-system theory of student motivation (Harter, 1985; Connell & Wellborn, 1991; Wellborn, 2013) as a catalyst for the student-teacher relationship. The basic fundamentals of the self-system theory are used to emphasize *autonomy*, *relatedness* and *competency* in a person throughout their childhood and adolescence (Harter, 1983). This chapter will also form the connections between the self-system theory and Pianta's (1999) work with student-teacher relationships at the elementary level. Further investigation into student-teacher relationships led to the development of the research tools utilized in this study, based off the works of Pianta and Gehlbach, Brinkworth & Harris' (2011). Written permission was given by both authors to use their instruments as reference for this study.

Finally, this chapter will also provide a description of the context of study, and the setting where the study took place. This is an embedded case study and the focus of the research involved SPHS. This study explored four different teachers at SPHS and the students whom they teach. The choice of this setting was due to the access for the researcher, convenience and the unique characteristics of the one-to-one environment.

The One-to-One Environment

The origins of a one-to-one program began with *Microsoft's* Anytime, Anywhere Learning Program (Mouza, 2008). The results of which were studied by the Rockman group of San Francisco California and presented in a three-part report known as the

Rockman Report. The first report (Rockman, 1997) was a study of the pilot program, which consisted of 26 public and private schools throughout the country. One major influence this report had on the one-to-one environment was setting definitions of what a one-to-one environment looked like. That program found five different models of a one-to-one program; 1) The concentrated model which was a 100% one-to-one ratio, 2) a dispersed model where students with a one-to-one device are dispersed throughout the school and grades, 3) the class set model in which a set of devices is purchased for one class only, 4) a desktop model where devices were purchased and a few were given to each classroom for use, and 5) a mixed model in which districts combine two of the four approaches (p. iii). The Rockman Report built a foundation to explore other issues like program implementation, contextual ideas, program impacts, and challenges to a one-to-one environment. For the purposes of this study, the one-to-one program will reflect a concentrated model.

Along with the first report, the second report (Rockman, 1998) displays qualitative information on the roles of the students and teachers and how those roles change in a one-to-one environment. That report found that "teachers were becoming learners and facilitators, and students were taking more of a teaching role" (p 26). In addition, teacher collaboration increased and student collaboration grew, especially in the area of group problem solving. Adversely, in the third and final report (Rockman, 2000), the author moves away from exploring the student-teacher roles and focuses on the technology itself and its impact on learning, an important study, but one that falls short of examining the student-teacher relationship.

In the Fall of 2002, The Governor of Maine decided to put a laptop in the hands of every seventh grade student throughout the State. The result was The Maine Learning Technology Initiative (MLTI) (Beaudry, 2004; Fairman, 2004; Garthwait & Weller, 2005; Harris & Smith, 2004; Lane, 2003; Ross & Rosenberg, 2007; Silvernail & Gritter, 2007; Silvernail & Lane, 2004; Warchauser, 2006). As with Microsoft's program, the MLTI also dispersed its findings over five different reports published between February and July of 2004. Report number one displayed the impact of the one-to-one program on middle school teachers and students (Silvernail & Lane, 2004). Report number two represented the perceptions of special education teachers on the use of the devices for students with disabilities (Harris & Smith, 2004). Report number three examined the changing roles of teachers and students when using technology (Fairman, 2004), while report number four was about teachers using the one-to-one device for student assessments (Beaudry, 2004). Report number five was a case study on two specific teachers who implemented the one-to-one devices in the their seventh grade classroom (Garthwait & Weller, 2004).

Silvernail and Lane (2004) specifically influenced this research when the authors found that "teachers and students roles changed very rapidly" once the program began, and that students often became the teachers of technology skills and teachers were the learners" (p. 1). Coupled with the findings from the Rockman Report (1998), there was an emerging pattern in what the one-to-one devices were doing for the roles of teachers and students in the classroom. Moreover, Silvernail and Lane brought emerging information to the one-to-one discussion about a shift in paradigm for the teacher from

teaching specific facts and figures to teaching students how to find information, facts, and figures on their own.

In 2009 the MLTI expanded to include all high schools throughout Maine. In an agreement with Apple Inc., the state leased 100,000 laptop computers for use by teachers and students in the classroom (Connerty-Marin, 2009). A report by Pinkham and Johnson (2013) found that the high school teachers believe the one-to-one device has many benefits. While their investment in the program is not equal to the enthusiasm of middle school teachers, they believe that teaching has shifted to a more student-centered model. In addition, the teachers feel their technology skills and knowledge have improved significantly.

While Maine's program and to some extent Microsoft's initiative have been the largest and most widely studied programs in the evolution of one-to-one, other initiatives have occurred throughout the country in different school districts, counties, and states. Between 2003 and 2004 the Henrico County Public Schools in Virginia instituted a one-to-one program with every 6 – 12 grade student and teacher (Lemke & Martin, 2004c; Zucker & McGhee, 2005). At that time, it was the largest one-to-one initiative in the country that was eventually passed by Maine. A study by Dr. Dale Mann (2008) finds that teachers and students both believe their roles have changed within the classroom due to the one-to-one device. Students became more "active learners" and teachers become "coaches" (p. 4). Between 2000 and 2006, several levels of one-to-one program were initiated in Michigan and Indiana, but neither looked at the relationship between students and teachers or their changing roles in the classroom (Lemke & Martin, 2004a; Lemke & Martin, 2004b). Currently North Carolina has over 74 middle and high schools across the

state participating in the North Carolina Technology Learning Initiative (NCTLI). Since 2008 approximately 204,327 students in North Carolina have participated in the one-to-one program. Reports have found higher test scores, fewer discipline problems and greater student engagement among the schools participating in the initiative (Spires, Oliver & Corn, 2012; Uffman, 2013).

Most recently the one-to-one environment has moved beyond the primary and secondary levels to higher education. In 2011 the School at The University of Pennsylvania began experimenting with a one-to-one environment in the MBA program for executives (Bradshaw, 2011). The program began with 20 students and expanded to 400 in the following semester. In 2013, the Wharton iPad program was recognized by Apple Inc. as a distinguished program, due to the fact that 95% of their Executive MBA students utilize their iPad exclusively to access their class materials. This program has increased collaboration of their students both in person and across time zones (Wharton, 2013). Similarly in 2010, Reed College conducted a study of using the iPad for higher education purposes. It was determined that the iPad or other tablet devices will become commonplace on college campuses in the near future (Marmarelli, 2011; Kaufman, 2011).

When reviewing the research related to one-to-one programs through the country, it is evident they have produced a wide variety of results. Schools have been researching one-to-one environments for over a decade, and they have exhausted the topics of implementation, academic achievement, and providing Internet access to under-represented students. This research will expand upon the small amount of information

studied about the relationship between the students and the teachers and how their roles have changed and will change.

The Student-Teacher Relationship

A review of the one-to-one environment is not totally void of investigation into the student-teacher relationship. In 2012 Nicholas J. Sauers and Scott McLeod published a brief for the Center for the Advanced Study of Technology Leadership in Education at the University of Kentucky, outlining what the research up until that point said about one-to-one computing initiatives. Their findings show many attributes of the student-teacher relationship in the one-to-one setting. While the research does not specifically discuss the topic of the student-teacher relationship many of the finding are directly correlated to the positive or negative change in that relationship.

The research shows the impact of a one-to-one program in Massachusetts, which professes teacher beliefs that student engagement and motivation increased within the environment (Bebell & Kay, 2010). There are also other aspects discovered by these researchers that contribute to the improvement of the student-teacher relationship such as students being more satisfied with school, and less frequent disciplinary issues. In a study of a Florida one-to-one program, Dawson, Cavanaugh, and Ritzhaupt (2006) found that the biggest changes were in greater student attention, interest and engagement. They also noted greater use of "project based learning" where the student becomes more independent in their learning, and the teacher becomes a facilitator. Additionally the study indicates that teachers began to change their practice through professional development and increase in their technology literacy. These finding were bolstered by a study by Russell, Bebell and Higgins (2004) which involved numerous classroom

observation indicating that teachers spent much less time in large classroom instruction and a greater amount of time with small group and individual instruction while in the one-to-one setting.

Changes in relationships, within the one-to-one setting occur on different levels including between students, between teachers, between teachers and administrators, and between teachers and their students (Spires et. al, 2012). Increased communication between students is a direct result of increased presence on discussion platforms and course management software (Lei & Zhao, 2008). Students also use electronic sources of communication like email and chat rooms, as well as, increased use of interactive project-based lessons within the classroom (Mouza, 2008).

Group oriented, project-based lessons are the entrance point for improved relationships between students, as well as, between student and teacher. Students have the ability to keep up to date with teacher information through the use of a one-to-one device and the classroom interactive website or wiki page (Beball & Kay, 2010). Teachers are also forced to take a more facilitative role within the project-based lessons while students are given greater responsibility for content (Lowther, Ross & Morrison, 2003). Moreover, the introduction of new technology into the classroom allows for teachers and students to work collaboratively to understand the possibilities available with the new device. Teachers often ask students questions about the technology in order to learn the best uses for themselves (Lai & Zhao, 2008).

The study by Bebell & Kay (2010) which is a summary of a quantitative study from the Berkshire Wireless Learning Initiative (BWLI) reveals teacher perceptions and classroom observations within the one-to-one environment. The results find that over

50% of the teachers believed that their role as a teacher within their classroom changed. They also believed that their role outside the classroom changed as well. The one-to-one program extended student-teacher communication outside of the traditional school classroom. Students and teachers used the technology to communicate outside of the school day to discuss homework and other problems related to instruction.

Research tool. Development of the research instrument for this embedded case study relied heavily on the Student-Teacher Relationship Scale (STRS) for working with students in preschool, elementary, and middle school years developed by Robert Pianta (1999). The 28-item instrument measures the "teacher's perception of his or her relationship with a student, and a teacher's beliefs about the student's feelings toward the teacher" (p. 1). As depicted in figure 1, the three dimensions of this relationship - conflict, closeness and dependency - match very well with the self-system theory dimensions of autonomy, relatedness and competence. In the STRS, conflict is defined as the degree to which the teacher struggles with the student and the relationship is negative with conflicting motivation. Closeness is defined as the degree to which the teacher perceives open communication with the student, and the relationship is highly effective. Dependency is defined as the teacher's perception of how much the student is dependent on the teacher to be successful.

The work of Gehlback, Brinkworth and Harris (2011) has extended Pianta's work with young students to students at the secondary level. These authors also find that students at the secondary level "strive for autonomy" (p. 3), "want to feel more connected" (p. 6), and that "perceived teacher caring was also associated with students; academic self-efficacy and intrinsic valuing of education" (p. 7). Positive teacher-student

relationships have an even greater importance at the secondary level. Pianta and Allen (2008) profess that positive relationships with adults are the most important aspect of promoting positive youth development at the secondary level. In addition, Murray and Pianta (2007) attribute improvements in social interactions, social competence, a sense of well-being, academic achievement, and reduction in school failure to a positive teacher-student relationship with high school students.

Pianta's (1999) STRS was adapted and tested to form the interview protocol to explore teacher's perceptions of their students within the one-to-on environment. The measurement for TSR by Gehlbach, Brinkworth, and Harris (2011) was adapted for this study and tested as a survey instrument for high school students in the one-to-one environment.

The Self-System Theory

In developing a framework for exploring the student-teacher relationship, the self-system theory became obvious as the proper model to connect with the one-to-one environment. The self-system theory espouses that students have three needs that underlie motivation for learning: autonomy, relatedness, and competency (Avenilla, 2003; Connell & Wellborn, 1991; Harter, 1983; Lynch & Cicchetti, 2002; Newman, 2000; Newman, 2002; Peirson & Connell, 1992; Reeve, Jang, Carrel, Jeon & Barch, 2004; Rimm-Kaufman, 2012; Wellborn, 2013). Autonomy is as a student's need for a choice about what they do and to "identify with the value of the chosen activity" (Pierson & Connell, 1992, p. 301, Wellborn, 2013). Relatedness is defined as the "need to feel securely connected to the social surround, and the need to experience one-self as worthy and capable" (Lynch & Cicchetti, 2002, p. 522, Wellborn, 2013). Competency is defined as

student's feeling of reaching their desired end and a sense of academic success based on their desire (Pierson & Connell, 1992; Newman, 2002).

Connell and Wellborn (1991) developed the self-system processes or the self-system theory for the sole purpose of applying the model to schools and its implications on institutional reform. When investigating the student-teacher relationship, the self-system theory emerged as a viable framework due to the focus on the three processes of autonomy, relatedness, and competency, as well as its similarity to Pianta's (1999) work with student-teacher relationships as discussed in chapter one. Connell and Wellborn developed their theory from many historical psychologists, most especially Harter (1983) who determined the role of autonomy, relatedness and competency in the motivation of children.

The self-system theory in relation to education, and specifically its role in the one-to-one environment, is appropriate when evaluating the motivation of both the students and the teachers; therefore, it is an appropriate framework for this research. The following are explanations of the self-system theory according to Connell and Wellborn (1991) adapted to take into account the one-to-one environment. In order to feel a sense of competence in the one-to-one environment, two components must be attained: (1) knowledge about how to use the device appropriately in school and (2) the belief that one can execute these strategies for success. The dimensions of the self-system theory associated with autonomy relate to the student's regulation of their own learning. In the one-to-one environment the tablet itself allows students to become engaged in their learning; students enjoy work and solving problems. The measure of student's relatedness to social and educational partners is evaluated by two constructs: emotional security and

need for relationships. The one-to-one environment allows students and teachers to build a better relationship because the environment itself brings them closer together.

In relation to the perceived competence, perceived autonomy, and perceived relatedness by students and teachers, this study will look at how the one-to-one environment has impacted those perceptions for both the students and teachers. While the use of this theory as a framework is limited, the American Psychological Association finds it, along with attachment theory, as one of two perspectives on why children behave certain ways in the classroom (Rimm-Kaufman, 2012). Attachment theory was considered but discarded because it relates to the absence of a relationship between two people as a deterrent to motivation (Bretherton, 1992). The self-systems theory espouses the importance of relationships for motivation. According to Rimm-Kaufman, the "self-system theory emphasizes the importance of students' motivation and by doing so explains the importance of teacher-child relationships" (p. 8). A positive student-teacher relationship assists students in meeting their needs for motivation. The author continues to explain

> Teachers offer feedback to students to support their feeling of confidence. Teachers who know their students' interests and preferences and show regard and respect for these individual differences bolster students' feelings of autonomy. Teachers who establish a personal and caring relationship and foster positive social interactions within their classrooms meet their students' needs for relatedness. (p. 8)

Improving the relationship between students and teachers has an important impact on the student's academic and social integrity. Teachers who nurture a positive relationship with their students create an environment essential for learning (Rimm-Kaufman, 2012).

Additional studies have used the self-system theory as a theoretical framework to study contextual events. Pierson and Connell (1992) determined that the theory espoused that students are motivated to engage in activities that meet their needs. However, the authors also determined that students avoid or become disassociated when situations disagree with their need for competency, autonomy, and relatedness (Pierson & Connell, 1992; Wellborn, 2013). The authors used the self-system theory as a process for students to become engaged or disengaged in school, and as a result, the academic achievement is affected. When students are not engaged and motivated, their academic achievement suffers and they are retained.

The self-system theory of motivation is a fitting framework for this study of student-teacher relationships in a one-to-one setting. It establishes three basic tenets of motivation: autonomy, relatedness, and competence. All are significant in establishing a positive relationship between teachers and students. Furthermore, it has been establish that the violation of one of these tenets of motivation could cause a negative relationship between teachers and students. The self-system theory also coupled well with Pianta's (1999) work with the Student-Teacher Relationship Scale and its three measured patterns of conflict, closeness and dependency.

Summary

The review of the literature shows a historical background of the one-to-one educational movement in the United States. It does not go into depth about the student

teacher relationship within the one-to-one setting because there is a gap in previous literature on this subject. This study will fill that gap by using the self-system theory of student motivation as a framework to explore the relationship between students and teachers in a high school one-to-one program. Previous research on the student-teacher relationship has been adapted to account for the one-to-one setting in order to examine the perceptions of the students and teachers within the program.

SPHS is a suburban high school serving 2000 students and employing 180 teachers, all of who work in a one-to-one environment. In this case, four specific teachers have been chosen and agreed to participate in the research. They have been interviewed and observed in the classroom setting, and all of their students have been surveyed to explore the student-teacher relationship.

Chapter Three

Methodology

Introduction

This chapter outlines the overall research methodology used to develop and field test protocols to investigate the relationship between students and teachers in a one-to-one classroom. The rationale for conducting a embedded case study and the overall qualitative strategy of inquiry, participant selection, data collection and analysis, and the quality and rigor of the data is delineated. This chapter also provides detailed information on the methodological approach of this research as well as issues with choosing this particular research method.

Purpose Statement

The purpose of this study was to explore the idea of the teacher-student relationship paradigm in a one-to-one technology learning initiative. This embedded case study involved the exploration of four classrooms within a suburban public high school in central New Jersey, a school that has initiated a school wide one-to-one learning initiative employing a tablet device as a learning tool. Specifically, I explored the role of the teachers and the students to determine if they perceived a change in their roles since the implementation of the iPad program. For the purpose of this study, the definition of change was relative to a switch from one existence to another. When the iPad was implemented into the curriculum, the relationship between the teachers and the students changed. Data gathered from this research will help the study site and other institutions by adopting such programs to better understand the impact of the iPad on the classroom

environment. Furthermore, it will allow teachers and students to better understand their roles in a one-to-one setting.

The choice of the facility was based on the recent implementation of a school-wide one-to-one digital environment and access for the researcher. Four teachers were selected as cases within the entirety of the school setting. Each teacher was selected because of his or her experience in teaching and perceived ability to use the technology in the classroom.

Research Questions

I explored four research questions concerning the relationship between teachers and students in SPHS's one-to-one environment and how that relationship changed after the implementation of an iPad. After extensive investigation, one overarching question emerged with four sub-questions.

1. What has the implementation of a one-to-one device for classroom instruction done to the student-teacher relationship?
    a. What was the teacher's perception of the teacher-student relationship before the one-to-one implementation?
    b. What was the teacher's perception of the teacher-student relationship after the one-to-one implementation?
    c. What is the student's perception of the teacher-student relationship in the one-to-one setting?
    d. Is the teacher's perception of the teacher-student relationship in alignment with the student's perceptions of the teacher-student relationship?

Strategy of Inquiry

The researcher chose the strategy of qualitative inquiry for reasons pertaining to working with human subjects and investigating their thoughts and feelings about a specific topic. Yin (2011, p.7) states five features of using qualitative research:

1. Studying the meaning of people's lives under real-world conditions.
2. Representing the views and perspectives of the people or participants in the study.
3. Covering the contextual conditions within which people live.
4. Contributing insights into existing or emerging concepts that may help to explain human social behavior.
5. Striving to use multiple sources of evidence rather than relying on a single source alone.

Additionally, Creswell (2009) describes qualitative research as exploring and understanding the meaning of individuals or groups focusing on the individual's meaning and the importance of rendering the complexity of a situation.

When completing an extensive review of this research topic, I determined that the parameters met all five of Yin's features for qualitative research, but most importantly the fourth, looking for insights into emerging concepts. Because the topic being explored involves not only relationships between students and teachers, but also more specifically the relationships between students and teachers in a technology environment, it calls for a complex examination of multiple concepts. Drake, Shanks, and Broadbent (1998) found that when studying information systems, qualitative research methods allow the

researcher to better understand social phenomena in their natural setting and cultural context. Although many qualitative methods exist, the case study was the most widely used method.

Qualitative research, and more specifically this embedded case study "call for the persons most responsible for interpretations to be in the field, making observations, exercising subjective judgment, and analyzing and synthesizing, all the while realizing their own consciousness" (Stake, 1995, p. 41). The goal of qualitative research is not to find a definitive answer to a problem but to understand the nature of the problem, as it exists in its natural element. The limitations that exist in qualitative research are the very factors that make it a strong method of inquiry (Stake, 1995).

A case study is an empirical inquiry that investigates a contemporary subject in depth within its real-life context, especially when the boundaries between subject and context are not clearly evident (Yin, 2013). It is widely used by researchers across social sciences. The case study was the qualitative strategy employed by the researcher in this study. It was chosen over other qualitative methods because the parameters of the study were not controlled by the researcher and had several points of data collection leading to validation and rigor (Stake, 1995; Yin, 2013). For this research, the single case being studied was that of the one-to-one program at SPHS. An innovative program may be a case (Stake, 1995).

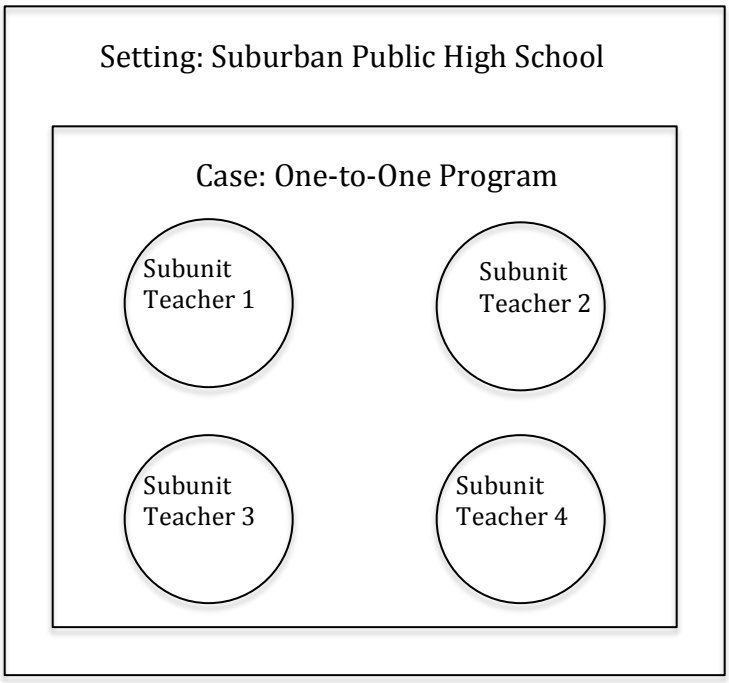
This case study was guided by Yin's (2013) *Case Study Research: Design and Methods.* This study will be bounded by very few limitations. The very nature of a case study is limited to the program, event, or activity that the researcher is exploring. This case is also bound by time (Stake, 1995). Moreover, qualitative research on a larger scale

is somewhat subjective and limited to the behaviors and perspectives of the researcher, participants, and audience. It is important for the researcher to determine validity and authenticity of the work to counteract much of the subjectivity (Creswell, 2009). Yin (2013) promotes the act of documenting as many steps of the research procedures as possible to establish reliability.

The specific type of design employed was an embedded case study with one context and four embedded sub-units (Yin, 3013). The overall context was the one-to-one program and the sub-units were made up of four teachers and the students in their classrooms. This study was not considered a multiple-case design because all four teachers were working under the same context in the same high school unit. Figure 2 depicts the basic design for this embedded case study.

Figure 2

Case Study Design: Embedded Case



The embedded design was chosen logically because of the nature of education. Given the number of teachers within the school and the subjective differences in teaching styles, it was a reasonable conclusion that more than one unit of analysis should be studied. One of the pitfalls of an embedded case study is that the researcher loses sight of the overall case and focuses mainly on the subunits, in this case the teachers and students (Yin, 2013). For this study, that pitfall was avoided by focusing on the experiences of teachers and students prior to and after the implementation of the one-to-one program, specifically focusing in on the effects of the tablet device on the relationship.

Case study research allows for rich descriptions of the subject being studied (Yin, 2013). This particular strategy of inquiry was chosen because of the complicated nature of the subject being studied. Education in a one-to-one setting is not a new idea, but it is an accomplishment that has been most recently attained. SPHS presents the researcher with an opportunity of access to study the student-teacher relationship in a one-to-one program. Therefore, using an embedded case study approach to explore the relationship between different teachers and their students can have a lasting effect on the school, other institutions moving toward the same endeavor, and the future of secondary education as a whole.

Participant Selection

According to Krathwohl and Smith (2005) "the key to qualitative sampling is choosing those cases from which one can learn the most" (p. 128). In that regard, it is necessary in this case to choose participants who illustrate certain characteristics within the one-to-one environment. The specific teachers chosen needed to be willing

participants in the research and committed to working in a strong one-to-one environment. Miles and Huberman (1994) call this an extreme case of sampling, where the participants are chosen because of a specific set of characteristics. In this case, the primary characteristic was the teachers' frequent use of the iPad.

Along with Krathwohl and Smith; Drake, Graeme, and Broadbent (1998) discuss important steps to completing case study research, most critically the importance of collecting case study data from participants. Flyvbjerg (2006) discusses case selection and specifically extreme cases as being more revealing to the data process compared with the average sampling. He adds that random sampling often does not allow for deep insight into an issue, whereas a few specific cases will allow the data to show solutions to a problem, not just the problem itself.

For this embedded case study, SPHS served as the context for the study, the one-to-one program as the case itself, and the four teachers chosen to participate as subunits. The four teachers were randomly chosen from a pool of teachers with the following characteristics: the teacher works at SPHS, the teacher has taught a significant amount of years at SPHS in order to speak to a relationship prior to and after the one-to-one implementation, and the teacher uses the tablet device for educational purposes. The four teachers were interviewed and observed using the tablet in the classroom. In addition, the students of the four teachers were given on-line questionnaires accounting for a third data collection set. Furthermore, a random group of surveyed students were selected to participate in a focus group specifically to determine if the perception of the teachers was congruent with the perceptions of the students. Permission for research was granted to the researcher by the school principal, the superintendent of schools, and board of education.

The underage students were issued consent forms and were given permission by the parents before participating in the survey and focus group (Appendix B).

Case study site. As stated previously, SPHS is a leader in the field of one-to-one education. In 2011 SPHS instituted a one-to-one program utilizing Apple iPad devices. Roughly 2000 students were provided with an iPad to be used as a learning tool in and out of the classroom. The iPad is used for classwork and homework to communicate, collaborate, research, read, take notes and explore new digital content (Monroe Township, 2011). This site was chosen because of its availability and unique characteristics as a one-to-one environment. During the first year of implementation (2011-2012), the iPad was used sparingly and the year was mostly spent learning the ways to properly implement the device. During the following school year, the teachers and students created a more authentic one-to-one environment by using the devices at a greater rate (Rockman, 1997). The third year of implementation (2013-2014) allowed teachers and students enough time to become familiar with learning in this environment, but not too much time to forget what it was like to work in an environment before the iPads were introduced.

Participant sampling. In the unique case of SPHS, the pool of participants was sampled with only a few parameters: Teachers had to be (1) employed by SPHS; they had to be (2) willing to participate; (3) teaching for more than five years at SPHS, and (4) they had to use the iPad for instructional purposes. The third parameter allowed enough time for the teacher to understand what it was like to teach without the iPad and compare that to teaching with the iPad. It was determined that five years was an optimal amount of time because when the research began the iPad had been in use for two and a half years.

A teacher working in the school for two and a half years with the iPad needed to have two and a half years teacher without it, prior to implementation. Therefore five years was determined as the time need teaching to participate in this research. From that pool of teachers, the four participants were randomly sampled. Random sampling increases the credibility of the results and reduces suspicion about why certain cases were chosen (Patton, 2002).

While random, the sample was still purposeful which is important because purposeful sampling focuses on selecting information-rich cases yielding in-depth understanding rather than empirical generalizations (Patton, 2002). In this case, in order to obtain information-rich data, some teachers were removed from the pool of participants before random sampling occurred. Along with teachers who worked in the district for five years or less, teachers who had an extended period of time on leave were removed. For example, a teacher on maternity leave for the school year 2012-2013 was removed from the pool because her experience with the iPad in the classroom was not as rich as other participants given the gap in instructional time. Furthermore, all department heads were removed from the pool because they taught fewer classes and came in contact with fewer students throughout the day, thus diminishing the information-rich data. Finally, the pool of teachers was limited to content area classes such as Math, Language Arts, Social Studies, World Language and Special Education, given that elective subjects used the iPad on a less regular basis. After limiting the pool, it became possible to randomly select the 4 participants from a total of 92 teachers.

The four teachers selected purposefully, but randomly were two mathematics teachers, one science teacher and one social studies teacher. Coincidentally, without

planning, the sampling produced two male and two female teachers (Figure 3). All teachers were contacted by an email inquiring about their interest in participating in the study. The contact occurred outside school hours and the participants were informed that the research would start in the winter of 2013-2014. At that time, the participants received the informed consent and copies of the interview protocol (Appendix C).

Figure 3

Teacher Participant Demographics

Teacher	Gender	Subject	Age	Years Teaching
Teacher 1	Male	Social Studies	32	8 years
Teacher 2	Female	Math	28	6 years
Teacher 3	Male	Science	36	10 years
Teacher 4	Female	Math	28	6 years

In addition to the teachers, the students enrolled in their classes at the time of research also received a questionnaire (Appendix D). Student participants came from all grade levels, however most came from the ninth grade due to the fact that the randomly chosen teachers taught mostly ninth grade (Figure 4). Of the 207 students, nearly half were female (n = 106) and the other half male (n = 101). To obtain permission to question the students, a letter of request was sent to the building principal, the district superintendent and the district Board of Education, all of which approved the questioning of students and observation of classrooms. The students questioned also had permission from their guardian to do so; consent forms were issued and returned to the researcher.

Figure 4

Student Participant Grade Levels

Instrumentation

Data was collected using semi-structured interviews, questionnaires, observation and a focus group. The interview protocol was developed for the four teacher participants and piloted prior to implementation. The questionnaire was constructed for the students and piloted prior to its use. Observation was conducted to verify the data collected through student questionnaire and teacher interview about the relationship between teacher and student and the perceived role of each. The focus group was used to obtain further student perspective for correlation with teacher data.

Teacher interview protocol. The tool used to develop the interviews and student questionnaires was adapted from a previously used student-teacher relationship scale, which explores the dyadic relationship between secondary students and their teachers (Gehlbach, Brinkworht & Harris 2011). The scale was drawn from Pianta's (1999) work on student-teacher relationships in the primary grades and was tested in open-ended interviews and focus groups with 18 teachers and 26 students to determine "points of

overlap, divergence, and disparities in terminology" (Gehlbach, et. al., 2011, p. 11). Experts in the field, 9 for the student form and 11 for the teacher form then validated the scale. Finally, the forms were piloted and tested on 20 students and 8 teachers, which led to additional wording changes, culminating in the final product.

The teacher interview protocol was further constructed into three parts using the themes of the self-system theory of motivation: *autonomy*, *relatedness,* and *competence*. Three teachers within SPHS piloted the protocol. The interviews were recorded and notes were taken to understand the meaning that the one-to-one student-teacher relationship has for possible participants (Maxwell, 1998). Because it was the end of the school year, it was difficult to schedule free time with the teachers involved, but otherwise the practical aspects of establishing access, making contact, and conducting the interviews were easily achieved. (Seidman, 2006).

One common definition extracted from the pilot was that of consistent iPad use by the teacher. One of the parameters for sampling was that teachers had to use the iPad on a consistent basis. The pilot uncovered common answers from the teachers as to what consistent meant, namely that students have electronic access to content at all times, but have a choice whether to access it or not. In addition, all classroom activities can be completed digitally, including, but not limited to, note taking, test taking and access to a textbook. Moreover, students and teachers were able to communicate and interact digitally using email and applications to exchange and mark classwork and homework. All participants believed that their students were much more organized than before. Students did not lose assignments and became "more accountable" to the teacher for their responsibilities. Math students never forgot their textbook because it was on their iPad;

and all homework and classwork was available twenty-four hours a day, seven days a week.

As a result of the pilot, it was possible to conclude that using the iPad in their classroom polarized teachers. It was evident that two participants thoroughly enjoy having the iPad in class, the third liked it as well but not as much as the first two and the forth did not like the iPad at all. By looking at the questions and how they were grouped by the three different categories of autonomy, relatedness and competence, the wording of the items was adjusted to fall in line with the theme each item represented. In addition, I reworded the questions that did not get an appropriate response or for which all three participants had the same answers.

The need to move away from the mindset of assessing the iPad initiative and move into exploring how teachers and students felt about their relationship with one another was recognized. Questions were developed to ask teachers how they felt and what they believed rather than what was working or not working in the classroom. The questions became more probing to discover the trust between teacher and student, rather than just skim the surface of that relationship. For instance, one sub-question asked how the student role in the class had changed. One participant answered, "students now have more of an opportunity to generate work." The real question should have probed more deeply into the feelings the participant had, how he felt about the change in the students, and what the use of the iPad had done to the relationship in the classroom.

As a result of the pilot, the questions were reworded and configured differently within the protocol to become more congruent with the themes of the self-system theory. The major factor elicited from the protocol was delving more deeply into the feelings and

perceptions of the participants. In doing so, the interview questions became better aligned with the research questions. The Matrix (Figure 5) displays how each Interview Protocol Question (Q) corresponds to each research question.

Figure 5

Interview Protocol Matrix

	Q2	Q2a	Q2b	Q2c	Q3	Q3a	Q3b	Q3c	Q4	Q4a	Q4b	Q4c
Teacher perception prior?		●	●						●	●		●
Teacher perception after?	●	●	●	●	●	●		●	●	●	●	●
Student perception after?		●	●	●		●	●	●	●	●	●	●
Are the perceptions aligned?		●	●	●		●		●	●	●	●	●

Student questionnaire. The original questionnaire was developed from the same student-teacher relationship scale, which explored the dyadic relationship between secondary students and their teachers (Gehlbach, Brinkworth & Harris 2011). The scale was drawn from Pianta's (1999) work on student teacher relationships in the primary grades. The questionnaire was piloted to random students and data were analyzed after 10 students completed the survey. It is important to note that the piloted questions were randomly handed to students at SPHS. The questionnaire was completed via the Internet and was completely anonymous. In order to avoid impropriety by the researcher the web

address for the survey was distributed by another student from the school with no description of what the questions were for. The 10 original questions were posed to discover discrepancies in the answers and clarify the questions. The final product still contained 10 questions, but they were clearer and more explicitly depicted the difference between using the iPad and not using the iPad. For example, the first piloted question stated, "The iPad allows me to have a better relationship with my teacher." After getting mostly neutral responses the question was rephrased to state, "Now that I am using the iPad, I have a better relationship with my teacher than before the iPad was introduced." The expectation was that responses would vary on a scale from strongly agree to strongly disagree.

Student questions followed along the same self-system theory theme, inquiring into their trust in the teachers' ability to use the iPad, the support they believed they had while learning in this environment, and how important the teacher was in an interactive technology environment. The instrument was finalized after making the necessary changes.

Data Analysis

The techniques employed to gather data for this research study were semi-structured interviews, observation with the use of field notes, student surveys, and a focus group. Teacher interviews and student surveys represented the most important source of data. The classroom observations and focus group serve as triangulation of data collected and coded from the interviews and surveys.

Prior to analysis, data from both teachers and students sources were organized and collected. Analysis of the data occurred in two cycles. The first cycle of In Vivo coding,

or literal coding, used the actual words and phrases of the participants in themed categories (Saldana, 2012). In Vivo coding is vital for "interview transcripts as a method of attuning yourself to participant language, perspectives, and worldviews" (Saldana, 2012, p. 48). In Vivo coding is also beneficial in working with student's surveys when comparing their ideas with the ideas of their teachers.

The second cycle of coding reduced the amount of data further from phrases to major themes through pattern coding. Pattern coding takes similarly coded data and further organizes the meanings to limit the number of codes from the first cycle (Miles & Huberman, 1994; Saldana, 2012). Pattern codes in the second cycle were put into three categories based on the self-system theory of motivation, autonomy, competency, and relatedness. The creation of categories prior to coding expedited the analysis process (Miles & Huberman, 1994) and helped strengthen the validity of the study (Yin, 2013).

The goal of data analysis was to link the themes from interviews, surveys, and observation notes to the theoretical perspective of the self-system theory. According to Yin (2013), "better case studies are the ones in which the explanations have reflected some theoretically significant propositions" (p. 141). Critical insights were found in gathering codes and themes according to the self-system theory of motivation.

Summary

Four teachers were randomly sampled from SPHS to participate in the embedded case study exploring the student teacher relationship in a one-to-one setting. SPHS is a suburban high school in central New Jersey that has established a school wide one-to-one learning environment. The four teachers and their students participated in the research study that involved interviewing the teachers, surveying the students, and classroom

observations. Data collected from this study was analyzed by looking for similar codes and themes from collected information. Those themes were then categorized using the self-system theory of motivation, specifically the attributes of autonomy, competency and relatedness.

I designed this study to elicit data about student-teacher relationships in a one-to-one educational program. The steps outlined in this chapter enabled data to be gathered related to the topic and research questions posed.

Chapter Four

Results

Introduction

While case study analysis is one of the least developed aspects of doing case study research, a system of data collection and analysis to fit this particular study has been compiled (Yin, 2011, Stake 2013). Chapter Four explains the organization and analysis of data collected in this study. This chapter will describe the sample of the study, including students and teachers, as well as the process of data gathering and recording. This chapter will also map the process of data analysis, including the coding process, the reasons for initial and subsequent coding, questions and observations throughout the coding process, and overall analytic conclusions (Saldana, 2012; Patton, 2002; Miles & Huberman, 1994).

In order to explore the idea of the teacher-student relationship paradigm in a one-to-one technology learning initiative, the role of the teachers and their students was explored to determine if either group perceived a change in their roles since the implementation of the one-to-one device (Pianta, 1999; Gehlbach, Brinkworth, & Harris, 2011). This study examined those perceptions and explored any changes that occurred inside and outside the classroom. As one-to-one technology environments are becoming more popular across the country; this study will help to identify expected changes in the teacher/student relationship before issues occur.

This exploration into teacher and student perceptions occurred using four methods of data collection, student survey, teacher interview, classroom observation and a student focus group (Yin, 2011). After the teachers were randomly chosen, the students whom

they teach were asked to be a part of the research as well. Those student participants were given a 10-question survey asking about their perceived relationship with their teacher. The four teachers participating in the survey were then interviewed using a piloted interview protocol (Pianta 1999, Gehlbach, Brinkworth, & Harris, 2011). Each interview was approximately one hour long. Interviews were transcribed and coded (Saldana, 2012). Teachers were also observed for one hour interacting with their students in the classroom. Once all data were coded and analyzed, a group of students was chosen to form a focus group to verify and triangulate the data.

Organization and Interpretation

Four teachers were chosen at random to participate in this embedded case study. A population was determined using the previously explained set of parameters purposefully reducing the population of STHS to teachers who significantly use the iPad in their classrooms; from that population four teachers were randomly chosen (Patton, 2002). The first teacher chosen (T1) is a teacher of social studies. He has been teaching for eight years, all of which have been at this high school. The second teacher chosen (T2) is a teacher of mathematics. She has been teaching for six years, all of which have been at this high school. The third teacher chosen (T3) is a teacher of Science. He has been teaching for 10 years, all of which have been at this high school. The fourth teacher chosen (T4) is a teacher of Mathematics. She has been a teacher for six years, all of which have been at this high school.

Once the four teachers were chosen and agreed to participate in the embedded case study, their students automatically became participants. The class rosters were cross-referenced to determine if any students where scheduled for more than one of the chosen

teachers. A list of 327 possible student participants was compiled. Each student was given a consent form to have their parents grant permission for them to participate. Of the 327 possible participants, only 217 students returned the permission slips, 10 of whose parents responded NO to participating. At this point the research sample was four teachers and 207 students. Of the students who responded and participated in the study, 58 had T1 as a teacher, 42 had T2, 40 had T3, and 62 had T4 (Figure 6). Any student who had more than one teacher were assigned to the teacher whose class they returned their permission slip with.

Figure 6

Student Participants Per Teacher

Students	**Teacher**
58	T1
42	T2
40	T3
62	T4
207	

Findings

Teacher interviews. All teacher participants' interviews were audio recorded. All participants were informed of the recording in accordance with ethical procedures. The audio recordings were sent out for transcription by a professional, third party, company.

Upon completion, the transcription was once again edited for further confirmation of accuracy and tone, and some minor adjustments were made. Interview data were reduced through two cycles of coding. The first cycle of In Vivo or literal coding took literal phrases from the interview transcripts and placed them into three specific categories: *autonomy*, *relatedness,* and *competency* (Appendix E), which are the three elements of the Self-System Theory (Saldana, 2012). The coding process was specifically designed to extract information solely for the three self-system categories. According to Saldana, In Vivo coding is appropriate for all types of qualitative research. It is most applicable in this study because it helps extract words or phrases that are specific to the one-to-one environment, the self-system theory, and the student-teacher relationship.

There were other phrases and words from the transcriptions that did not fit into these categories and were determined to be outliers in this research. Many of the outlying codes show perceptions of the one-to-one environment outside the realm of the student-teacher relationship. There were also codes that were not spoken of more than once; therefore the lack of repetition determined them to be less significant. There are few themes because the questions were so specifically designed around the categories of the self-system theory the teachers did not have much opportunity to express their perceptions beyond the topic. Outlying themes include teachers believing their was less discipline needed in the classroom, students were more organized, more experienced teacher did not like using the iPad, and the students have become too reliant on the iPad itself.

There were also single codes that were opposite to the actual findings. For example, the research showed that the students were more engaged in their learning while

in the one-to-one environment. There was a single code from teacher 2 that said at a certain point students were not engaged. This piece of data was not included in the findings as to support engagement, but does lend to the overall determination of teachers needing training to keep students engaged.

In the second cycle of coding, taking actual phrases from the text and grouping them together as themes within the categories reduced data even further (Appendix F). This grouping was successfully completed using pattern coding (Saldana, 2012). "Pattern coding is a way of grouping those summaries into a smaller number of sets, themes or constructs" (Saldana, 2012). An example of pattern coding utilized in the autonomy category is when T1 explained, "I do think I let them [students] do a lot more stuff independently and find information on their own" and teacher T2 also said, "It's a little bit more leeway for them [students], so they get the work done, they have a little bit more freedom." Those two pieces of data information were reduced to the pattern code "student independence". Codes or summaries from the first cycle were put through a second cycle of pattern coding to merge codes that were conceptually similar.

During the first cycle of coding autonomy had 81 different words or phrases associated with its category. Those 81 words and phrases were reduced in the second round to 55 codes. Five themes were derived from those codes. For relatedness 49 words or phrases were taken from the interviews. The second round reduced that number to 31 codes. Four different themes emerged from those codes. Figure 7, shows the different themes that emerged from the second round of coding. Competency had 57 words or phrases associated with that category which came from the teacher interviews. In the

second round, those words and phrases were reduced to 44 codes. Three different themes emerged from those codes.

Figure 7

Themes from second-cycle coding of teacher interviews

FINAL THEMES	# of codes from second cycle
AUTONOMY	
Student independence	17 of 55 Autonomy Codes
Student responsibility	12 of 55 Autonomy Codes
Student driven/teacher steps back	11 of 55 Autonomy Codes
Student freedom/choice	9 of 55 Autonomy Codes
Greater access/new experiences	6 of 55 Autonomy Codes
RELATEDNESS	
More Individual contact	12 of 31 Relatedness Codes
More student engagement	10 of 31 Relatedness Codes
Some collaboration between students	6 of 31 Relatedness Codes
No collaboration between students	2 of 31 Relatedness Codes
COMPETENCY	
Teacher becomes a learner	18 of 44 Competency Codes
Technology/Apps change education	15 of 44 Competency Codes
Students are good with technology	12 of 44 Competency Codes

For autonomy, defined by a student's need for choice and value within that choice (Pierson & Connell, 1992; Wellborn, 2013), three major themes emerged from the second cycle of coding the teacher interviews. Students were more independent in their learning, students were more responsible for their own learning, and learning was student-driven as

the teacher took a step back from instruction. Two other minor categories were also discovered where students had freedom and choice in their own education, and they also had greater access to new experiences in the one-to-one environment. More than any other category, autonomy had the most codes in cycle two (n = 55). When it comes to the one-to-one environment, from the perspective of the teacher, autonomy is the most prevalent characteristic.

Relatedness is defined as students having social connection and self-worth (Lynch & Cicchetti, 2002 & Wellborn, 2013). Teachers feel that if they have more individual contact with students, the students are more engaged in the content, and the students are connected to the learning. One area in which the teachers believed the classroom environment has fallen short was in the students' relationship with each other. The relatedness category had the least number of codes after the first cycle (n = 31). Coincidentally, teacher T2 had more codes for relatedness than autonomy and competency while the other teachers had fewer codes for relatedness and a greater number for the other two categories. This is significant due to the fact that teacher T2 was less of a user of the iPad than the other three teachers. It can be argued that the iPad may have a negative affect on the relationship between students in the classroom.

From the perspective of all the teachers, competency was not an issue for the students. Competency is defined as the ability to reach academic goals (Pierson & Connell, 1992; Newman, 2002). In this case competency means the ability to reach academic goals using the technology available. Major themes that emerged in this category are the following: the teacher has actually become more of a learner, education has changed for students because of the technology and introduction of new applications,

and students are very competent with the technology. Codes for this category (n = 44) were related to how the teacher perceived the classroom to have changed and what new tools students were using in the classroom.

Observations. Classroom observations of the teacher were used as a follow-up to the interview. All observations were conducted in one class period and produced pages of handwritten field notes. SPHS runs on block scheduling so a class period is 86 minutes long. All notes were recorded in a research journal and later coded. Because the notes were written in a descriptive manner, two cycles of coding were deemed unnecessary (Saldana, 2012). The observation was used as confirmation of the information given in the interview; therefore, coding occurred in the same manner by looking for evidence of autonomy, relatedness, and competency. Also observations occurred towards the end of the school year approximately 3 months after the initial teacher interviews. This is significant for the fact that students and teachers had more than half the year to work together in the one-to-one environment.

For the observations, the codes were linked specifically to the teacher rather than to the overall self-system theory. For example, when coding for autonomy, events that occurred in the classroom, which presented an autonomous situation for the students, was noted. When coding for teacher T1, all autonomy codes were used to confirm or disagree with information gained during T1's interview. More specifically, during the interview, T1 said that "most of the work now is more student-driven rather than teacher-driven" and that in many cases the students' "work ethic has improved." This information was verified in an observation when students were given individual instructions for a web-quest assignment. Those students were self-motivated to seek out information without

being fed information by the teacher. This self-motivation is an improvement of the student's from the teacher's perspective.

The observations determined that for the most part, the teachers practiced what they preached. Students seemed to be more responsible for their work and were given independent assignments to complete during the class period. There was some interaction between students when completing work, and the teacher was able to move from group to group or person to person to check for understanding and facilitate as needed. During the observation for teacher T3, the organization and responsibility of the students were evident. When conducting a lab experiment for Biology class, there was no need for paper, binders, folders, pens, or pencils; everything was stored in and manipulated from the iPad device. All documents that the students needed were on the teacher web page, and when the students completed the activity the lab reports were uploaded to the teacher via the eBackpack application. The entre school uses the eBackpack tool which is a shared network space for students and teachers to exchange information, similar tools include Dropbox, WEBDav, and other shared folders (Foote, 2012) Any direct instruction came prior to the activity, but for the most part an interaction between the teacher and student was for the purpose of answering specific questions.

An observation of note was for teacher T2 who spent most of the time standing in the front of the room lecturing about solving problems on a digital projection device. This, however, was consistent with the interview when it was stated that she did not like to teach from other places in the classroom other than the front. The students had the option of not using the iPad during class and some opted to use pen and paper when taking notes. As stated previously, the interesting aspect of teacher T2 was that the

interview had a greater number of codes for relatedness than the other teachers who claimed to have a more one-to-one atmosphere with their students. This suggests that the one-to-one environment does not foster the relatedness element of the self-system theory. It could also mean that the idea of relatedness can transcend the difference between a one-to-one setting and the tradition classroom setting.

Student surveys. The students were surveyed using the online service surveymonkey.com. Students were asked 10 questions that had been previously piloted. The survey tool allows for different levels of analysis, but most importantly it compiles the results in percentage form. Each question can then be scaled to see if the group overall disagrees or agrees with a statement. For instance, the students were asked if they (1) strongly disagreed, (2) disagreed, (3) were neutral in their feelings, (4) agreed, or (5) strongly agreed to the statement, "The teacher has the ability to support my learning on the iPad." This question refers to the teacher's competence with the technology and the teacher's ability to relate to the students on that level. On the whole, the students agreed with this statement, with 62% of the students responding agree or strongly agree.

All students were asked to compare their relationship, in one way or another, with their teacher within the one-to-one environment. Students ranged in grade from ninth to twelfth and had worked outside the one-to-one environment in the past. Forty-six percent of the students believe their relationship with their teacher's is the same as it was before the iPad (n = 95), 23.6% believe that their relationship is better (n = 49), and 30.5% disagree that it is better than it was before (n = 63) (Appendix G). In addition, some students echo the sentiment of the teachers when 32.9% of the students believe they do not have a better relationship with their classmates (n = 68) than prior to the iPad, and

38.2% believed their relationship had stayed the same (n = 79). A slight majority of the students 32.4% believed that the teacher's lack of knowledge on the iPad affected their relationship (n = 67) and 35.8% of the students believed they would enjoy class more if the teacher was more proficient on the iPad (n = 74).

Conversely, a strong majority (61.8%) of the students believed the teachers had the ability to support their learning (n = 128), but the students were split in believing their teachers were challenging them using the iPad. Unfortunately, the data was unable to differentiate between the teachers and their specific students. The one area where students were in most agreement was when they were asked if their teacher was still important to them in the classroom: 81.6% felt their teacher was still important (n = 169), and 62.3% still believed it was important to have an interpersonal relationship with their teacher (n = 129).

Student focus group. A student focus group was established for triangulation purposes, as a fourth set of data (Yin 2013). Students were chosen from the pool of 207, two from each teacher. The student's names were drawn randomly. The focus group consisted of eight students (five boys and three girls). One participant was a senior, two were juniors, three were sophomores, and two were freshmen. An additional parental form consenting participation in the focus group was signed and returned in compliance with ethical research.

Most interesting about the focus group was that there was very little disagreement among the students. They all seemed to be of the same opinion when it came to how the iPad was used and how they related to their teacher. One of the students voiced an opinion about not liking to use the iPad because it became a distraction during the day.

Many times in class, the student found herself distracted by searching the Internet for topics of interest rather than listening to the teacher. However, she did agree that if the iPad was being used for something engaging in the classroom, then she would enjoy it. This finding is consistent with the outcomes of a study by Ozdemir (2014) who found that using iPads enhanced student-centered learning by creating a collaborative environment, however, they could become a distraction if not used appropriately.

Based on the codes from the interview, nine questions were developed for the focus group, which lasted approximately 45 minutes. The eight students gave their opinion on what the teachers believed their relationships were with the students. The students were first asked if they felt like the iPad classroom now gave them more independence or freedom in their learning. They all agreed that it depended on the teacher and how the iPad was used in the classroom. Some teachers used the iPad properly, and students felt they had more independence in those classes. When asked if they felt more responsible for their work, they all agreed that the iPad and the ability to connect with their teachers at any time have made them more responsible for their work.

There was a slight discrepancy when the students were questioned about the one-to-one instruction from the teacher and their relationship with other students in the classroom. The students felt that the attention they got from the teacher was the same as it was before, meaning the iPad had not really changed the individual instruction they received from teachers. They did note, however, that they had a greater opportunity to discover new information for themselves with the iPad than before. The students also believed they were closer and more connected to their peers inside and outside the classroom. This was the opposite of what the teachers portrayed in their interviews and

contradicted the results from the student survey. The survey showed that only 29% of the students agreed or strongly agreed when asked whether they had a better relationship with their classmates when using the iPad than before the iPad had been introduced. Even though data from teacher interviews and student surveys was congruent, the focus group was able to shed light on the increased relationship between students. This is a confirming result for the importance of interviewing a focused group of participants, especially when the participants are youngsters (Yin, 2011)

When asked specifically about their relationship with their teachers in the iPad environment, the students explained that not much had changed within the classroom, but much did change outside the school day. One student said, "I can easily connect with a teacher" when talking about doing work outside the classroom. Another said, "The teacher is always there when I need her." While this seemed to be a common trend in the math and science classes, a teachers availability depends more on the ability and willingness of the teacher to use the tools available. In fact, when asked what could be changed to enhance the relationship between the students and the teachers, the students said more teachers using the iPad on a consistent basis. They believed that the teacher's unwillingness to use or learn how to use the iPad was a barrier to a positive relationship.

Analysis

To answer the research question, I took the information gathered during the initial interviews and confirmed or denied during the observations along with the students' perceptions. The overarching question — What has the implementation of a one-to-one device for classroom instruction done to student-teacher relationship? — will be

answered last. The sub questions will be answered first in order to lead up to answering the overarching question at the end.

Sub-question A. What was the teacher's perception of the teacher-student relationship before the one-to-one implementation? It was evident from the interviews that the relationship prior to the one-to-one implementation was different than after the iPad implementation; this is not to say that it was worse or better, just different. When it came to instruction, the teachers overwhelmingly believed that the one-to-one environment allowed for greater individual attention from the teacher to the student. This was not possible in the earlier environment because so much time was spent delivering instruction that there was very little time to cultivate relationships. Teacher T4 specifically believed that the one-to-one environment gave her approximately 30 additional minutes of individualized instruction as compared to last year. Teacher T3 also commented that he "can help individual students rather than spending the whole time in front of the class just presenting the material for the first time."

Three of the four teachers had moved to paperless environments. The apps available on the iPad create an environment better suited for digital workflow between the student and teachers and are completely paperless. Teachers T3 and T4 had instituted what is called a flipped classroom. The flipped classroom is a modern instructional approach using technology as a delivery system. Most flipped classroom models flip the modern instructional methods where students view teacher-made or authored videos at home and build upon that instruction by doing extension work in the classroom (Tucker, 2012). The most crucial element of the flipped classroom is the ability to reteach only the aspects of instruction that is needed in order to save class time. Teacher T3 stated:

> I do a lot of flipped class models where they're doing their actual kind of learning at home and then when they come in we're just reviewing and I can really pinpoint what a student has missed and can help individual students rather than spending the whole time in front of the class just presenting the material for the first time.

In using a flipped classroom, another teacher believed that her time spent outside the classroom working with students had been reduced significantly. She no longer has to stay with students after school or during her prep. "The need for me to be after school was tremendous. I would stay after school probably about, at least an hour everyday. Sometimes I would sacrifice my lunches to help students who were having difficulties" (Teacher 4). In the flipped classroom, the students now have more responsibility to get prepared at home in order for the teacher to assist them when they came into class.

The iPad implementation has not been a positive move for all teachers, however; Teacher T2 believed her students were more often distracted than before, again supporting the findings of Ozdemir (2014). One of the major changes in her classroom was that often she had to teach from the back of the classroom to make sure her students were not using the iPad inappropriately. She believed that teaching from the back of the room was

> Not really a feasible thing, especially in a math classroom. I need to be up to the board, but the kids are so distracted, especially this bunch. This year with fancy football drafts and all the other things that with the click of a button they [students] are turned off.

Teacher T1 also believed that in some cases, the device made the students lazy:

> Just because it's there for them, and if they have to answer a question they can just look it up or they can talk right into it and it does the work for them. And sometimes they'll admit, "I didn't write my homework down because I can look on the wiki and then I don't look on the wiki and I didn't do my homework." So I think sometimes it makes them lazy, and I think sometimes they use it as an excuse.

Overall, the observations and interviews revealed that the most telltale sign of change was the choice that the students had in their own education. It is true that students today are given more freedom and responsibility, but that responsibility adds to the learning process and the autonomy of student achievement. In every class, some type of choice was observed that was not available to the students prior to the one-to-one initiative. Teacher T3 conducted a lab in his Biology class where groups of students had to use technology to record their findings and then upload the results to the teacher. The groups had to decide what was the best way to record the lab. They were given the option of using either their iPad or a MacBook laptop to record. Some groups were observed using the iPad, some the MacBook, and some both. In Teacher T4's math class, the work was distributed electronically and the students were given a choice on how to complete the work, which app to use, and which method of workflow to use to return their work to the teacher. The only stipulation the teacher had was that the work had to be completed by a certain date and time. Students also had the option of using the technology or not, which was even true in the flipped classrooms. In every class, at least one student took notes using traditional pen and paper; however, because the main venue for workflow

between the teacher and student was technology-based, the students who did not use the iPad to complete work would eventually have to use technology to get their work to the teacher.

Prior to the one-to-one initiative, the teachers gave the students less choice in their education. This was not a vindictive move by the teacher but rather an inherent aspect of the traditional classroom where the teacher preached and the students listened. The teacher gave the students very little autonomy in their learning, where they found difficulty in reaching their academic goals and very little self-worth. In the one-to-one environment, for good or for bad, the students have more choice and responsibility in what they learned and how they produced evidence of their learning.

Sub-question B. What was the teacher's perception of the teacher-student relationship after the one-to-one implementation? In contrast to the traditional *sage on the stage* classroom where the teacher teaches and the students sit quietly and learn, the one-to-one classroom is a partnership between the students and the teachers. It was evident from interviews and observations that a different conversation happened between the teacher and the students that encompassed a new type of learning. Both were more connected now than before, whether in the classroom or out of the classroom; the teacher also became more of a resource for the students. Teacher T4 wanted her students to be in contact with her at all times:

> My students email me, and I'm always connected with some sort of device. And I tell them to email me because I'd rather them ask me a question than give up on the entire assignment. So a lot of times students will take pictures of a problem that is troubling them and ask me, "what do I do next?"

Teacher T4 believed that her dedication to her students had strengthened their relationship, which would not be possible without the technology. She also recognized that this was not the norm:

> If I'm up until 10 o'clock, and that's a personal choice, but I do respond to that because even if it's 10 o'clock and they're stuck on their homework, they have to get their homework to me by 7:26 a.m. So they're doing everything that they can to get it to me.

The teachers also believed they had more trust in their students now than before, perhaps because the students had a more difficult time coming up with excuses for missed work. Teacher T1 believed he "can allow them to do more independently than [he] could before and [he] can trust them to do the work independently." This relationship was evident during the classroom observation when the students were completing a web-quest using their iPads. Even though two teachers (T1 and an in-class resource teacher) were in the classroom, T1 was the main source of information, not because he was more knowledgeable with the subject, but because he was more competent with the technology. There was an obvious disconnect between the students and the resource teacher. It was evident by the look on the students' faces and by the fact that the resource teacher had to ask the classroom teacher for additional assistance. This led to the conclusion that the teacher competent in the technology was connected and had a relationship with the students. The teacher who showed competence in the technology had a closer relationship with the students than the teacher who did not. According to

teacher T1, it is very important for the teacher to be competent in the technology in order to be a supportive resource.

> My job now is not just to give them the knowledge. You know, in the information age they're surrounded with information. There are so many sources of information it's our job to help them figure out, to help them learn how to filter that information and pick out what's important, and that is a much more important skill than just finding the information.

The teachers understood that the students were capable when it came to technology; they also understood and were comfortable with the fact that they were not as savvy as the students. However, it was important for the teachers to put some trust in the students when it came to using technology. If the teacher did not know something, both teacher and students could work hand-in-hand to complete the task. All the teachers described this level of trust as being part of the student-teacher relationship in a one-to-one setting. Some of the teachers at this high school had extra training in the use of the iPad in the classroom. This was an optional program from Apple that teachers could take part in and that would allow them to be considered Apple Vanguard Teachers. Three of the teachers in this study were Vanguard teachers (T1, T3, and T4), and they seemed to use and trust using the iPad in their classroom more than teacher T2.

With the implementation of the one-to-one device, the teachers and the students had to cultivate a partnership of trust. While all four teachers in this study showed that partnership, I was able to glimpse what that lack of trust looked like. It was evident that without the partnership and trust, a positive relationship between the teacher and the students would be difficult.

Sub-question C. What is the students' perception of the teacher-student relationship in the one-to-one setting? Using the information gathered through the student survey and the student focus group, it was determined that the students did not see a significant change in the student-teacher relationship inside the classroom, but saw a difference in their relationship outside the classroom. The results to the question, "Now that I am using the iPad, I have a better relationship with my teacher than before the iPad was introduced," are as follows: 45.9% of the students had no feeling on the question, leading to the belief that they felt the relationship had not changed either way. In addition, 30.4% of the students either disagreed or strongly disagreed with the statement. Thus, when asked if their relationship had positively changed, only 23.7% of the students surveyed believed it had. Furthermore, the students in the focus group believed their relationship had not changed in the classroom on a daily basis; however, they were connected more than ever to their teachers once they left the building.

When asked, the students believed it was very important for the students and the teacher to have a positive relationship. When presented with the statement, "It is no longer necessary for the teacher and I to have an interpersonal relationship because of the iPad," only 13.4% of the students agreed with it. Moreover, when asked, "Now that they use the iPad for educational purposes, is the teacher still important?" only 8.2% agreed that they no longer needed the teacher's assistance. These numbers were very telling because students were saying that the teacher was very important to the educational process, and for the most part they did not believe the relationship between them and their teachers had changed much.

The students were asked if the teacher had the ability to support their learning on the iPad; 61.8% agreed with this and 64.3% believed that their teachers were using the iPad appropriately. During the focus group, the students shared that the classes in which they felt more engaged by using the iPad were the classes in which the teacher used the iPad appropriately. This was informative because the teachers who were using the iPad and supported learning were also the ones that are engaging students and having a positive relationship with them. The focus group was asked specifically what could make their relationship with their teachers stronger. They claimed that all teachers needed to use the iPad to the fullest potential. The teachers with successful classrooms and good relationships with their students were those immersed in the technology. This fact was also verified during classroom observations. Those teachers that allowed students to have greater autonomy with the device had a positive relationship with their students. The students believed that their relationship with their teachers would be enhanced if teachers were as engaged with the technology as the students.

Sub-question D. The final sub-question asked if the perception of the teacher and the perception of the student were in alignment when it came to the student-teacher relationship. The simple answer to this question is yes, but I discovered that the actual definition of the classroom has changed, not necessarily the relationship. Both the students and the teachers believed that when the device was used appropriately they were more connected to each other outside the classroom, so their perceptions were aligned. However, the scope of what is meant by the inside classroom has now expanded past the walls, desks, boards, and buildings. The one aspect in which the students and the teachers agreed the most was that they were now very connected. Even the teachers who did not

use the iPad in the classroom to its fullest capabilities were more connected to their students than ever before. I explored one example of a teacher (T4) who chose to be connected to her students regardless of time of day or night. She felt that if a student was doing homework at 10:00pm and she was awake, there was no reason she could not respond to questions that students may have. The students echoed that sentiment, knowing they could get information from their teachers at many different times throughout the day. "The teacher is always there when I need them," one student expressed during the focus group and continued by explaining that the relationship in school was still very similar to what it was before, but the relationship between himself and his teachers had also been enhanced outside of the classroom.

Students were able to receive instant feedback on questions they posed to teachers in emails and on classroom websites. One class had a class chat room where the teacher or other students could answer questions to help solve problems when students did their homework. When the work was completed and handed in digitally, the students received grades and feedback more quickly than before the implementation of one-to-one environment. The use of the application eBackpack allowed students and teacher to have an error-free workflow in a digital platform. The students were also quick to point out that while the relationship had changed somewhat, there was always room for improvement. According to one student, "Some teachers use it and some don't," and if every teacher used the iPad in the same way the device would be much more valuable to the student. This was relevant because the students believed that the teacher needed to be engaged with the technology if they expected the student to be engaged in their class. The

technology was there and the students wanted to use it, but the teacher must be competent with the technology for that engagement to exist.

Considering all the information gathered from the sub-questions, the overarching question of what the implementation of a one-to-one device for classroom instruction has done to the teacher-student relationship can now be answered. This technology has changed the relationship to encompass a larger time and scale for that relationship to exist. The relationship established by teacher and students for many years within the classroom has now expanded to outside the school building and into a global community. Teachers can be and are connected to their students any time of the day and night from anywhere in the world. The only requirement is an Internet connection. It is obvious that this type of relationship is new for both teachers and students, but it is one that must be embraced moving forward for students to be motivated to enhance their education.

Summary

It is apparent that the student-teacher relationship in the classrooms being studied had been affected by the implementation of the one-to-one environment. It was evident to both students and teachers that their relationship had changed in some way or another. Based on the self-system theory of motivation, the three elements related to good student engagement are autonomy, relatedness, and competency. Through this study, it was determined that the one-to-one environment allowed for both autonomy and competency at high levels, and relatedness in a smaller amount.

Both the students and the teachers believed that the iPad gave the students more independence with their learning. It allowed the teachers the ability to step back from direct instruction and give students greater autonomy in their learning. Students were

more connected to their teachers and, to a lesser extent, to their classmates than they were before. Most importantly, students and teachers who were both competent in the technology had a better relationship that those who did not.

It should also be noted that the one-to-one environment in question was one in which every student had an iPad. In other environments, students are issued laptop devices instead. Many of the aspects spoken about in this research were only accessible through the applications on the iPad device. Whether these applications are available on other devices are dependent on the device itself.

Ultimately, the one-to-one technology environment has changed the relationship between teachers and students. The factor that most affected that relationship was the willingness of both parties to use the technology to its fullest capabilities. When both students and teachers were immersed in the technology and continuously learned how to use the technology to create a better classroom environment, their relationship improved. Students and teachers are connected now more than ever, and if that connection is used for the purpose of teaching and learning, the one-to-one technology environment can be a powerful place.

Chapter Five

Discussion

Introduction

The intent of this embedded case study was to explore the student-teacher relationship in a one to-one technology setting. Four different teachers and their students were examined to determine if any change occurred in the their relationship when a one-to-one device, specifically the iPad, was used for educational purposes. To answer the overarching research question, What has the implementation of a one-to-one device for classroom instruction done to the student-teacher relationship, four sub-questions were answered first: 1. What was the teacher's perception of the teacher-student relationship before the one-to-one implementation? 2. What was the teacher's perception of the teacher-student relationship after the one-to-one implementation? 3. What is the student's perception of the teacher-student relationship in the one-to-one setting? 4. Is the teacher's perception of the teacher-student relationship in alignment with the student's perceptions of the teacher-student relationship? These four questions, and ultimately the overarching question were answered using four different forms of data collection encompassing the beliefs and experiences of both the teachers and the students.

Data were collected and coded using the self-system theory as a framework to connect the one-to-one environment to the student-teacher relationship. The self-system theory espouses that students have three needs that underlie motivation for learning: *autonomy*, *relatedness*, and *competency*. The framework was also developed for the purpose of applying the model to schools and the motivation of children in education. As a result of data analysis, it has been determined that the one-to-one environment has

changed the relationship between students and teachers from before the one-to-one device was used in the classroom. The one-to-one environment has created a more autonomous environment for student achievement, allowed students and teachers to become more connected to one another, and helped students and teachers become competent with educational technology.

Educational technology has become a very general term, along with describing student achievement in terms of 21st century skills. Educational leaders will often look at 21st Century skills as being the future of educational technology even though society is well into the 21st Century. What has been accomplished by this research as far as educational leadership is concerned is the beginning of a road map on how to encourage students and teachers to work together in a one-to-one technology classroom. Twenty-first century education is happening right now and in "this digital age, we are experiencing advances in educational technology that have the potential to enhance the teaching and learning process, as well as establish powerful connections with our communities and among an array of stakeholders" (Sheninger, 2014, p. 2). The findings in this study can assist school leaders in putting together a vision and plans to integrate one-to-one technology in the classrooms.

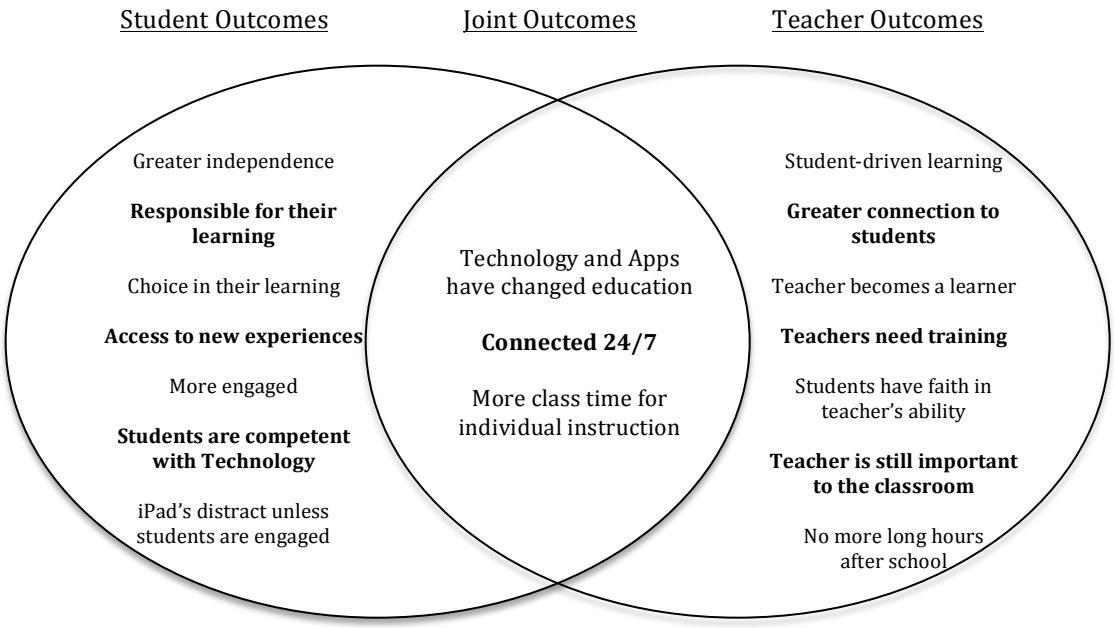
Findings and Interpretations

The ultimate result is that the one-to-one environment has changed the relationship between students and teachers by moving an existing relationship beyond the traditional classroom and creating a new relationship outside the walls of a school building. This change was examined through the framework of the self-systems theory and supported by previous findings in the literature. Specifically, this embedded case

study discovered particular outcomes for both teachers and students. These outcomes are directly related to the one-to-one environment, solidifying the result that the one-to-one environment has changed the relationship between the teacher and the student. Figure 8 represents the outcomes of this study in relationship to the students, teachers and both jointly.

Figure 8

Outcome of Change of Both Students and Teachers



These outcomes were discovered by examining the relationship between students and teachers in a one-to-one setting using the self-systems theory of motivation as a framework. Data compiled for each element of the framework was individually analyzed and the following results were discovered.

Autonomy. Defined as the student's need for choice and value within that choice, autonomy is one of the three elements of the self-system theory (Pierson & Connell, 1992, Wellborn, 2013). As a result of this embedded case study, it is determined that autonomy as a means of motivation is supported in the one-to-one environment more than any other element of the self-systems theory. This theme had the most codes in cycle one and during the second coding cycle codes from other categories were adjusted and moved into the autonomy category. The data shows that in the one-to-one environment the curriculum is more often student-driven, teachers are afforded the opportunity to take a step back from direct instruction, and students are allowed greater access to new experiences. Many of these findings support earlier research by Pinkham and Johnson (2013), which displayed the belief of high school teachers in Maine that students had a more student-centered learning experience in a one-to-one environment.

Autonomy allows teachers more time to work with students on an individual basis during the school day, creating an environment for education professionals to try new approaches to teaching and take risks inside and outside the classroom. Researchers in Henrico County, Virginia, discovered students taking a more active role in their learning while teachers become more of a coach figure (Mann, 2008). Earlier research on one-to-one learning also determined that this environment allows teachers to take a facilitative role in instruction, especially with project-based learning (Lowther, Ross & Morrison, 2003; Dawson, Cavanaugh & Ritzhaupt, 2006). Even one of the earliest Rockman reports (1998) stressed the opportunity for students to take on a teaching role in the classroom. These autonomous aspects are fortified by years of research on one-to-one environments.

What this embedded case study shows is greater student independence and increased responsibility over their own learning.

By creating a more autonomous environment, there is a risk taken by the teachers in allowing students to make the best decision for their own educational welfare (Boud, 2012). This embedded case study discovered two examples of teachers not fully trusting their students within the one-to-one environment. One teacher believed his students became lazy because the information they are looking for is provided to them in a moment's notice. Another commented that the one-to-one environment was forcing her to teach from the back of the classroom, in order to watch the students at all times, something she did not want to do. When comparing the two teachers that had trust issues and the other two teachers that did not, the data revealed that the teachers without the trust issues were using the iPad at a much higher level than the two with trust issues. In those classes, students were more autonomous with their learning; but at the same time teachers were making themselves more available to their students, giving them more responsibility and connecting to each other using the technology. This point reinforces the underpinnings of the student teacher relationship by Gehlbach, Brinkworth and Harris (2011) who determined that students at the secondary level strive for autonomy in their learning. When used properly the iPad allows students to have autonomy while still staying connected to their teachers.

This analysis leads to two conclusions. First, whether in a one-to-one setting or not, good teaching is good teaching. Students who feel self-worth in what they are learning will have the intrinsic motivation to work appropriately (Healy, 2011). The autonomy that comes with using the iPad enables students to personalize their education

allowing for greater self-worth and, in turn, develop more efficient work habits. Putting a weak teacher in any situation, one-to-one or not, will fail to have a positive affect on the students. This point demonstrates the need for further education of teachers as a must when implementing any new initiative.

This leads to the second conclusion. In the panel discussion with students, their claim was if teachers allowed students to use the iPad to its fullest potential more students would be engaged in what they were doing. They claim that the biggest barrier to student engagement is the teacher's unwillingness to learn about the iPad or their unwillingness to change how they teach their students (Ozdemir, 2014). The teachers' willingness to use the iPad more frequently will transform student's motivation. The education of teachers on the proper use of the iPad will only go so far, they have to be willing to explore and take risks in order for the environment to be rich with learning experiences (Boud, 2012). In Suburban Public High School, the teachers did not receive the proper training at the outset of the program and it had an effect on the relationship between the teachers and the students. Teachers had no idea how to teach in the one-to-one environment and be comfortable working with students who have a greater knowledge of technology than they did. Therefore, it is no surprise that two of the teachers had struggles trusting students within this environment.

Learning from this, district administration and implementers must be ready to have open discussions with teachers and other stakeholders about any initiative, especially one that will ask them to change the way they teach. Leading within a culture of change puts an emphasis on a leader's ability to understand, have insight and collaborate rather than engage in planning and creating action steps alone (Fullan, 2001;

DuFour & Marzano, 2011; Schrum, Galizio, & Ledesma, 2011). What this research shows is that teachers and students want to use the iPad and want to be engaged and connected, but they also want the opportunity to learn how to do that. This opens the door for teachers to be able to take risks with their lessons and how they teach their students. Teachers who are determined to be high-level risk takers have are more positive about the use of technology in the classroom than teachers who show a lower level of risk taking in the classroom (Offir & Katz, 1990 & Howard & Gigliotti, 2015). Allowing teachers to take risks with what they are doing in class, at the same time working with students to develop lessons using technology, will only bolster the student teacher relationship.

Relatedness. A student's social connection and self-worth in relationship to their social connection with peers and teachers is defined as relatedness, another element of the self-system theory (Lynch & Cicchetti, 2002; Wellborn, 2013). What the data indicates in this theme is the teacher's perceptions of a lack of relatedness within the one-to-one setting. The student perceptions however are not so clear. The results of the student survey suggest that students have neither a worse nor better relationship with their fellow classmates in the one-to-one environment. The feedback from the focus group suggests that the students have a positive relationship with their classmate, even perhaps more so than before the iPads. Relatedness had the least amount of codes among all the themes, but one teacher in particular had more codes than any other. It just so happens that teacher T2 actually showed the opposite trend of the other three teachers by having the most codes in relatedness and the least codes for autonomy. This teacher commented that she did not like using the iPads and believed they caused more harm then good. The perception of this teacher is that the students have a very good relationship with each

other without the iPad; therefore, the iPad is not necessarily needed. This is an interesting perspective, one that is shared by Boa and Lam (2008), who discovered that relatedness with students, teachers and even parents exists as a motivation in many areas of education. The analysis of this data shows that with or without the iPad, students can have good relationships amongst themselves and with their teachers, but if the iPad is not used at its highest possible level that relationship can become strained.

Overall, the perceptions of the students and the teachers are conflicting for this theme. The students feel that the iPad allows them to have good relationships with both their fellow students and the teacher. They do believe, however, it depends on the teacher and their use of the iPad (Ozdemir, 2014). Taking into account the perception of all the teachers in this embedded case study and the perception of the students, it is determined that if used correctly, the iPad can establish positive relatedness between students and between students and teachers. In the situation of teacher T2, she is correct that her students have a good relationship within the traditional classroom setting that is provided. Relatedness is not a phenomenon of the one-to-one classroom, it can and does exist in a traditional setting (Boa & Lam, 2008; Ozdemir, 2014). The one-to-one initiative has altered that traditional classroom, and once the traditional boundaries are removed, the relationship between teachers and students and between students themselves will exist beyond those walls as well.

The one-to-one setting allows for greater relatedness by allowing students and teachers greater opportunity to connect on an independent level. Russell, Bebell & Higgins (2004) supports this when they determined the one-to-one environment forced teachers to spend less time in large group settings and more time on individual

instruction. This embedded case study also discovered that the one-to-one environment gave teachers more class time to support instruction, up to an additional 30 minutes per week. That extra time teachers spend on individual instruction have allowed students to become more engaged with their learning as was determined by Oliver and Corn (2008), Bebell and Kay (2010) and Dawson, Cavanaugh and Ritzhaupt (2006). Students have a greater interest for their work and are motivated to become active learners in and out of the classroom (Mann, 2008). According to Foote (2012), the one-to-one program saves time by allowing students and teacher's convenient accessibility to the tools necessary to communicate with one another. This is especially true when all involved have a common device like the iPad.

The one-to-one setting at SPHS allows students to be connected twenty-four hours per day, seven day per week. This platform allows students to keep up-to-date with teacher information via interactive tools, allows students to communicate with each other about academic issues outside of the school day, and allows all parties to become more connected outside the traditional classroom. According to Bebell and Kay (2010) these are the cornerstone elements to a successful one-to-one program.

Moving forward, it is important to pay special attention to the relatedness piece of this embedded case study. With the possibility that increased autonomy may take away from relatedness between students and between teachers and students, educational leaders should take measures to counteract this possibility. Bao and Lam (2008), actually found that increased relatedness could inform the level of autonomy a student could experience directing their motivation. Allowing for professional development in the use of the iPads is a start, but continued education on higher level learning within the one-to-one

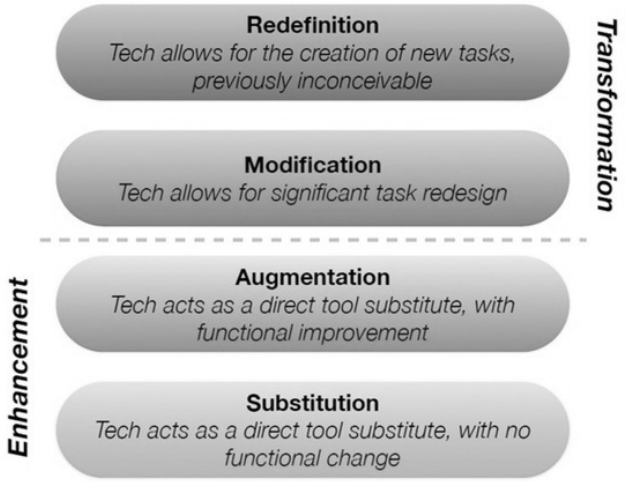
environment is necessary. Teachers need to foster the relatedness by using the iPad for the high level of instruction for which it was intended.

Participant teachers have taken yearlong professional development on building wikis, which are collaborative websites, where many participants can edit the same webpage. This small professional development takes the classroom project beyond the walls of the school where students can collaboratively work together on a project while being at different places. Teachers are also becoming more comfortable with a flipped classroom model where classwork and homework have reversed roles (Tucker, 2012). There are many benefits to using the flipped classroom including, student independence, access 24/7, better use of class time and high level of student engagement (Herreid & Schiller, 2013). In a traditional classroom, students tend to sit and listen to a lecture or see an instructional video and then are asked to go home and practice what they have learned on their own. In a flipped classroom, students are given web-based tutorials from the classroom teacher or an outside source as the mode of expanding capacity while outside the school day. When students return to the classroom, they are given supported practice time. That support comes from both the teacher and other students.

While wikis and flipped classrooms are a step in the right direction, they are only the tip of the iceberg when it comes to technology instruction in the one-to-one setting. SPHS has moved to a framework developed by Dr. Ruben Puentedura (2014) called the SAMR model (Figure 9). The SAMR model has four different stages, substitution, augmentation, modification and redefinition, in where teachers use technology to engage their students in the curriculum.

Figure 9

SAMR Model Framework



Ruben R. Puentedura, As We May Teach: Educational Technology, From Theory Into Practice. (2009)

As teachers use technology, they move along the continuum of the SAMR model to engage students in and out of the classroom. This type of continued education on the part of the teachers will address the need presented by the students of using the iPad to its fullest potential.

Teachers are also using technology to transform their classrooms through the use of social media. Social media allows groups of students and teachers to stay connected. Cochrane and Antonczak (2013) discovered that education should include engagement with new technologies, including mobile social media. By creating acceptable social media outlets for students and teachers, schools can design environments that move teachers from substitution to redefinition, at the same time increasing the relationships amongst the students.

Competency. In this one-to-one environment, competency is defined as the ability to reach academic goals using the iPad device (Pierson & Connell, 1992; Newman, 2002). The original thought was that this category would consist of the teacher's ability or inability to use the technology, as compared to the student's technological advancement and the resulting power struggle that occurred in the classroom. However, the teachers were more competent with the technology than first anticipated; and when they found themselves lacking in certain areas, they had no issue working with students to become more competent. In the same respect, however, the students proved to be as capable with the technology as first anticipated and in many areas excelled with the technological side of the iPad. It was determined, as with Dawson, Cavanaugh and Ritzhaupt (2006), that with enough technology professional development the teachers changed their practice and increased their technology literacy. As a result, the teacher became more confident with their abilities and their tech skills improved, the same result as Pinkham and Johnson (2013). Moreover, the collaboration of the iPad lends itself to a great deal of sharing allowing students, teachers, and administrators to learn at the same time. This is a benefit that leads to an overall improvement in the student-teacher relationship (Foote, 2012)

The earliest literature on one-to-one environments found that the roles of the teacher and the student would become reversed. Even in the early Rockman studies (1997, 1998, & 2000), it was determined that teachers would become learners and the student's teachers. In this embedded case study, roles were often reversed reflecting the same transformations that were discovered in that research. As with the 2004 study by Silvernail and Lane, students and teachers changed roles very rapidly. In all four cases,

there were instances where students would sit with the teachers and go over new applications and give technical advice on the iPad itself. This finding is similar to Lai and Zhao (2008) where teachers often asked students for assistance with technology for personal use. Of the teachers interviewed for this study, none of them ever felt threatened by the student's knowledge and none of them felt animosity towards their students about their knowledge. In fact both groups discussed their drive to find out more about working in the one-to-one program. As it has been documented earlier, the students are actually wanting for the teachers to implement greater use of the iPad in their classroom lessons.

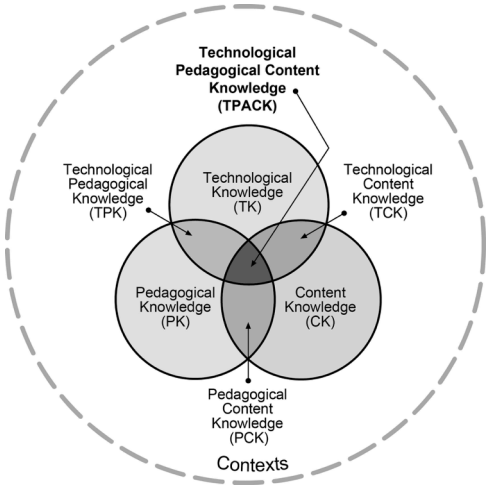
As was thought prior to the study, the students themselves had very little difficulty using the technology. Students in this study had the prior knowledge to use discussion boards, and other electronic communication to complete interactive projects and assignments (Lei & Zhao, 2008; Mouza, 2008). Other stakeholders, however, must embrace a change in the pedagogical fabric of what and how students are taught; this includes teachers, parents, administrators and boards of education. Competency must become an afterthought. Technological competency should be engrained within the fabric of content that it is no longer a discussion. When moving forward in a one-to-one environment, it is no longer a question if teachers are using the iPad's, but rather at what level they are being used.

Educational stakeholders need to adopt a framework to motivate and evaluate teacher performance in the one-to-one technology setting. At SPHS, the SAMR model is used, but other models do exist, like the Pedagogy-Andragogy-Heutagogy continuum (Lukin et al. 2010), or the TPACK framework (Shin et al., 2009). The TPACK framework works hand in hand with SAMR, a framework of the knowledge teachers

need to effectively teach with technology. While SAMR is more of a continuum, the TPACK framework uses technology, pedagogy and content in order to create new levels of knowledge that occur when the three meet (Figure 10).

Figure 10

The TPACK Framework



The data collected during this embedded case study indicates that autonomy had the largest amount of codes and competency had the least, evidence the students and teachers were not new to technology. The one-to-one environment has many moving parts that need to work to be successful; infrastructure is one while the actual technology is another. If the stakeholders are already familiar with the technology, the environment has a much greater chance at being successful. A one-to-one initiative is not much different from any other initiative from a leadership point of view. A good initiative has to be proven to have a positive impact on student learning, teachers and students need to

be trained on how to implement and sustain the initiative, and educational leaders have to be prepared to monitor and adjust to preserve the initiative for success.

Recommendations

We live in an ever-changing world when it comes to technology in the classroom. SPHS has afforded the researcher an opportunity to examine a new program on a large-scale implementation site. While these finding are applicable to SPHS, they can be used to inform similar implementations at other institutions. The implications of this study are far reaching beyond the case site. With the growing trend in one-to-one classrooms this research fills a gap thin the previously documented literature on one-to-one environment. It has linked the student-teacher relationship with the one-to-one environment and created a road map for implementation and sustenance of a one-to-one program. These findings and any subsequent research is vital to teachers, students, building administrators and district administrators working within or looking to being a one-to-one environment.

Further investigation is warranted to determine if the findings at one site are similar to those at other sites with one-to-one programs. For this type of research, the case study is appropriate because it gives an accurate display of the experiences and opinions of teachers and students (Yin, 2011; Yin 2013) In this particular embedded case study; the actual one-to-one program itself was studied. Other case studies could explore a specific teacher. For instance, a longitudinal study on the development of the relationship between one teacher and their students could be explored throughout an entire school year. Another case study could involve a state in which many schools have one-to-one programs where a selection of students and teachers are made. Of course, the bigger the case, the greater task a study would be.

Another avenue to study a one-to-one program at multiple sites would be a multi-case study analysis. By looking at more than one program at different schools, a multi-case study would allow the researcher to look at different aspects of programs with similarities (Stake, 2013). For instance, a one-to-one program in one school may use laptops while a program in another school uses tablets. In many cases one-to-one programs use a "bring your own device" philosophy in which students use their own laptops and tablets throughout the school day (Florence, 2012). When looking at the student-teacher relationship in different programs, the multi-case study could be very useful.

One interesting aspect of the student-teacher relationship in a one-to-one setting was that each relationship varied slightly due to other variables. One variable that would be interesting to explore is the relationship based upon the gender of a student or teacher (Incantalupo, Treagust, & Koul, 2014; Plumm 2008; Heemskerk, tan Dem & Admiral, 2009). This study was lucky enough to have two male and two female teachers; but it did not explore the effect of their gender on the relationship, nor did it look at the gender of the student. Moreover, the variable of the subject taught would also be a topic of interest for research. The use of the iPad in certain subjects is obviously an issue of concern, but to extend that issue by looking through the lens of the student-teacher relationship could be useful to the field. There have been studies conducted on the use of the one-to-one device in a STEM classroom (Hu & Garimella, 2014), with in the middle school social students classroom (Black, 2014), and even in a language arts classroom for disabled students (Saunders, Spooner, Browder, Wakeman, & Lee 2013). It was determined through this research that one teacher of mathematics did not like to use the iPad while another teacher of mathematics worked in a classroom that was almost paperless. This is

interesting because both teachers are female and both teachers are Mathematics teachers, what are the variables that separate the desire to work with the one-to-one technology?

It is obvious that teachers differ in many ways, their genders, their education and values, and their level of comfort with technology. The reason for extreme sampling in this case was because not all the teachers use the iPad the same due to subject matter, training, and exposure. The population for this embedded case study was taken from the five core content classes of math, science, language arts, social studies, and foreign language because the expectation was that those classes would be using the iPad to a greater level than other elective classes like gourmet foods or music. That is not to say those classes are not using the iPad, but the students in the core classes have the opportunity to be more exposed to it. With that premise, further study could be useful in exploring teachers that were chosen through extreme sampling based upon their individual use and knowledge of the technology.

One preference expressed by the students through interview was that classes would be more engaging if all teachers used the iPad on the same high level. A case study could be made to look specifically at the level of usage by teachers and compare the relationship between a low level user and their students, and a high level user and their students. In addition that study could look at the value of on-going professional development for teachers to ensure a high level of technology usage.

When implementing a one-to-one initiative, no matter what device is being used, it is prudent to look at the research based within the one-to-one environment. Adding to that research will only assist educational leaders and other stakeholders to make informed decisions about education and the best avenue for student achievement. The type of

program and school in which the program is being implemented will inform the research used. A case study will help explore the experiences of both teachers and students in the educational setting.

Summary

Leaders in the field of education should take from this research the need to sustain a one-to-one program, not just implement it. The decision to implement a one-to-one technology program has to do with much more than the student-teacher relationship, the relationship is what makes the program work and remain sustainable. It is determined that students are much more independent and responsible in the one-to-one environment. They are more organized and connected to the work they are producing. Most evident, students are connected to their teachers and other students to a greater extent. To sustain a one-to-one program and keep the student-teacher relationship positive, programs must involve on-going improvement in technological competency. Students are more motivated with teachers who use the iPad to the highest level of capabilities. To sustain the one-to-one program, the student-teacher relationship must be fostered through improvement in competence in order to enhance the learning process and make connections outside the traditional classroom.

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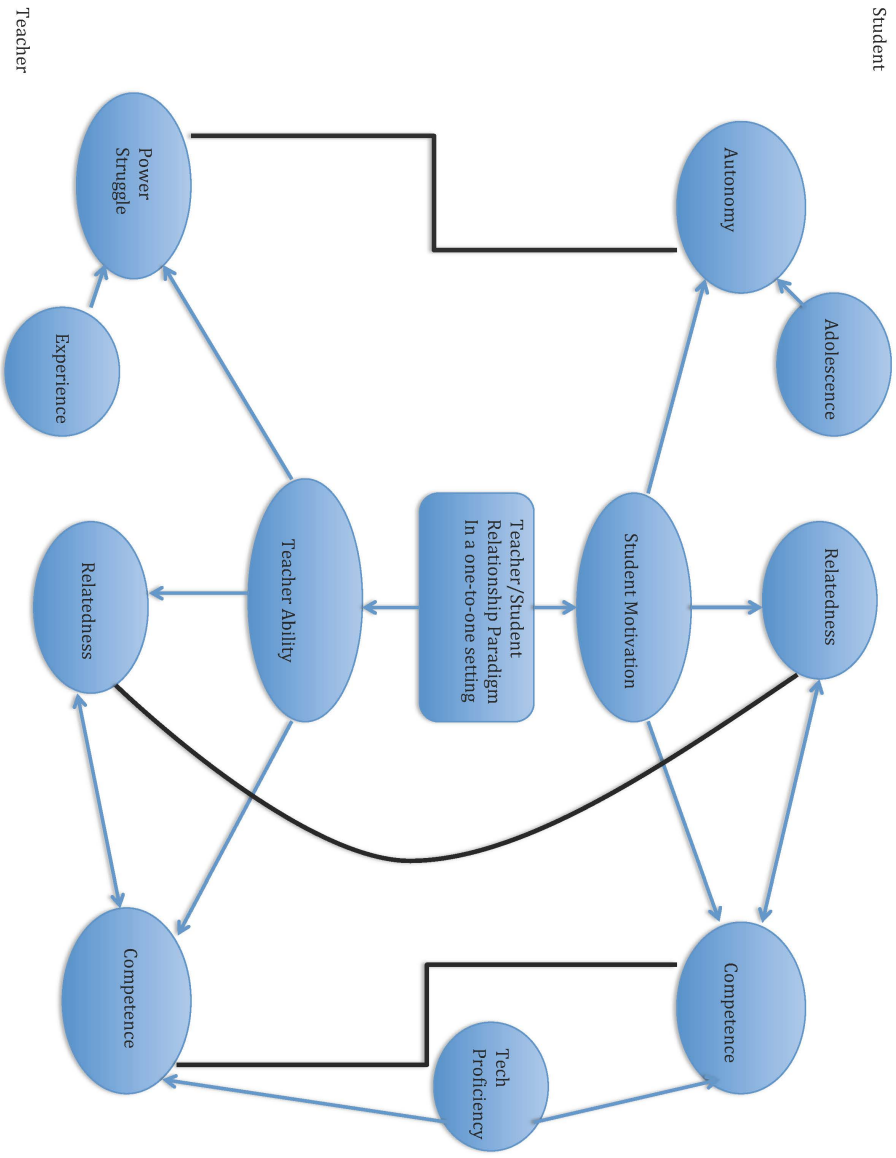
Appendix A

Concept Map



Appendix B

Informed Consent Forms for Teachers and Minors

Informed Consent Form

I _____ agree to participate in a study entitled " A Case Study: The Student/Teacher Relationship Paradigm in a One-to-One Setting," which is being conducted by Kevin Higgins, a doctoral student at Rowan University.

The purpose of this study is to explore the changing relationship between students and teachers when teaching and learning in a one-to-one setting. The data collected in this study will be submitted for publication of a doctoral dissertation.

I understand that I will be asked to complete one interview and one observation of my classroom interactions with my students. The time to complete the interview should be about one hour and the observation will be for one class period (84 minutes). I understand that the interview will be audio recorded and initial my approval here _____.

I understand that my responses will be anonymous and that all the data gathered will be confidential. I agree that any information obtained from this study may be used in any way thought best for publication or education provided that I am in no way identified and my name is not used.

I understand that there are no physical or psychological risks involved in this study, and that I am free to withdraw my participation at any time without penalty.

I understand that my participation does not imply employment with the state of New Jersey, Rowan University, the principal investigator, or any other project facilitator.

If I have any questions or problems concerning my participation in this study I may contact Kevin Higgins at (732) 996- 7723 or his advisor Dr. Shawna Bu' Shell at 856-256-4500 at extension 3854.

_____ _____
(Signature of Participant) (Date)

_____ _____
(Signature of Investigator) (Date)

Minor Consent Form

Dear Parent/Guardian:

I am a doctoral student in the Education Leadership Department at Rowan University. I will be conducting a research project under the supervision of Dr. Shawna Bu' Shell as part of my doctoral thesis entitled The Student-Teacher relationship in a One-to-One Technology Environment: A Case Study. I am requesting permission for your child to participate in this research. The goal of the study is to explore the nature of student/teacher interaction within the one-to-one setting.

Each student will be asked to complete an online survey of ten questions, which will take no longer than 5 minutes. To preserve confidentiality the surveys will be completely anonymous. Neither the researcher nor the student's teacher will know the source of the survey information. All data will be retained for a period of three years and then destroyed.

Your decision whether or not to allow your child to participate in this study will have absolutely no effect on your child's standing in his/her class. At the conclusion of the study a summary of the group results will be made available to all interested parents. If you have any questions or concerns please contact me at 732-996-7723, thank you. You can also contact my advisor Dr. Bu'Shell at 856-256-4500 at extension 3854.

The benefits of this research will improve the implementation of technology beyond the walls of Monroe Township High School and influence the way students and teachers work together in the classroom.

Sincerely,
Kevin Higgins

Please indicate whether or not you wish to have your child participate in this study by checking the appropriate statement below and returning this letter to your child's teacher by _____.

___ I grant permission for my child _____to participate in this study.

___ I do not grant permission for my child _____to participate in this study.

_____ _____
(Parent/Guardian signature) (Date)

Focus Group Minor Consent Form

Dear Parent/Guardian:

You have previously granted permission for your child to participate in a survey for research on my doctoral thesis entitled The Student-Teacher relationship in a One-to-One Technology Environment: A Case Study. I am asking once again for your child to participate in another aspect of the research project.

Your child was one of eight students randomly chosen to participate in a panel discussion with me on the use of iPads in the classroom. To preserve confidentiality your child's participation will be completely anonymous. The classroom teacher will not be aware of their participation and they will not be referred to by name in the research. The objective of this discussion is to verify and authenticate information gathered during previous stages of data collection. All data will be retained for a period of three years and then destroyed.

To prevent your child from missing classroom instruction, the panel discussion will take place after school on Thursday April 24th at 2:00pm. The school district provides late busses on Thursday so your child will have access to transportation if needed.

Your decision whether or not to allow your child to participate in this panel discussion will have absolutely no effect on your child's standing in his/her class. At the conclusion of the study a summary of the data will be made available to all interested parents. If you have any questions or concerns please contact me at 732-996-7723, thank you. You can also contact my advisor Dr. Bu'Shell at 856-256-4500 at extension 3854.

The benefits of this research will improve the implementation of technology beyond the walls of Monroe Township High School and influence the way students and teachers work together in the classroom. This part of the research is vital to validation of findings.

Sincerely,
Kevin Higgins

Please indicate whether or not you wish to have your child participate in this study by checking the appropriate statement below and returning to me as soon as possible

___ I grant permission for my child _____to participate in the panel discussion.

___ I do not grant permission for my child _____to participate in the panel discussion.

_____ _____
(Parent/Guardian signature) (Date)

Appendix C

Teacher Interview Protocol

Interview questions and possible follow up questions:

During this interview please keep in mind that all questions will ask you to compare your relationship with students from before the iPad initiative to your relationship now.

1. Can you give me a little background on how you use the iPad in class, if at all? And how your classroom has changed with the implementation of the one-to-one program?

Competency

2. How has the iPad affected the relationship between you and your students?
    a) How do you feel about the fact the students are so knowledgeable with the technology that is being used?
    b) Do you feel as important to your students and their growth as you did before the iPad?
    c) How do you think your students feel about you and your ability to assist them using the iPad

Autonomy

3. Do you feel students have an advantage in education with the iPad in the classroom?
    a) How has the use of the iPad affected your workload as the classroom teacher? How have you adjusted to that?
    b) Do you feel students are responsible enough to be trusted with using the iPad correctly?
    c) Do you feel frustrated when students do not use the iPad properly in the classroom?

Relatedness

4. How has your role as the classroom teacher changed since the iPad was introduced?
    a) How has the role of the student change?
    b) Do you believe the iPad allows students to work together and learn from each other?
    c) How much do students learn from you now, as compared to before the iPads?

Appendix D

Student Questionnaire

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1. Now that I am using the iPad, I have a better relationship with my teacher than before the iPad was introduced.

2. Now that I am using the iPad, I have a better relationship with my classmates than before the iPad was introduced

3. I know more about iPad technology than my teacher and that affects our relationship in the classroom.

4. I would enjoy class more if the teacher knew how to use the iPad appropriately.

5. The teacher has the ability to support my learning on the iPad.

6. It frustrates me when the teacher does not use the iPad appropriately.

7. The teacher assigns challenging with on the iPad.

8. It is no longer necessary for the teacher and I to have a interpersonal relationship because of the iPad.

9. The teacher put no restrictions on my use of the iPad in the classroom.

10. Now that I use the iPad for educational purposes, the teacher is no longer important.

Appendix E

First Cycle of In Vivo Coding

Autonomy **Teacher 1 (T1)**	
Most of the work now is more student driven rather than teacher driven,	"Student Driven"
have to write down the information but a lot of it now here's what you have to do. You find it, you find the sites and you're able to put that information into use whether	"the student" finds it
they're doing another iMovies so there's things that we couldn't do in the past	Student is doing new things
might have had them work, everybody didn't have the material that was necessary	Have new materials
I can allow them to do more independently than I could before and I could trust them to do the work independently	"Independence" "Trust"
I think their work ethic in some cases has improved	Improved work ethic
they're on all kind of different websites.	They can Research
So like what they're doing right now, they're on government websites from different countries so the US, CIA, Factbook website that's getting lot of information for them.	They can Research
they're allowed to get stuff that they otherwise wouldn't be able to get, have access to if they're just having the research on their own and reading books like I had to do when I was in school	Greater Access
you're able to do stuff in class that you otherwise would never been able to do before in the last 3 or 4 years	More classroom time for learning
the kids have been more responsible.	Students are responsible
I do think I let them do a lot more stuff independently and find information on their own	Independence
walk around and monitoring what they're doing and making sure that they're on task	Teacher monitor

You have to give students packets of stuff that was different and make them like compare and contrast things whereas now it's like, like you could find them on your own.	Student find information on their own
They're bored before because it was like the same thing this is what you are going to learn and everybody is learning the same thing. Now it's alright, we're doing Africa right now, here's your country, you find out this information about it and you find it out where you wanna find it out and in some cases it's oh, we'll kind of watch a video and get that information.	Student finds information on their own Choice in where to find information
I"t's on me if I don't get this done it's not because you didn't teach us or you didn't show what there to get"	Student responsibility
It's because I didn't look for it or I didn't find what I was looking for	Student responsibility
So I think the idea of learning is more on them, look for what's available to us now. Prior to that everybody had the same textbook so everybody was getting the same information and they were, that was it.	Student Independence
"I'm gonna dig deep or I'm gonna find more about this."	Student driven
All of them would gonna go home and look on the internet, now they're in class looking on the internet. I try to use it at least for half the block I have each day so I guess I'm good with it.	Greater access
Teacher 2 (T2)	
they have their textbooks on your iPad now	Online text
they're even allowed to turn in their homework on eBackpack	Online homework
they have weekly assignments that they have to turn in, they are using the iPads all the time to do research and articles,	Independent research
it's a little bit more leeway for them, you know, so they get the work done, they have a little bit more freedom	Student Freedom
I feel like I am more stepped back from the class a little bit	Teacher stepped back

now.	
hey know they can go look up questions and things like that and I feel I've taken more of a monitoring role	Teacher monitor
If I have a bunch of kids with their hands up then I can't get to all them it's easy for me to say why don't you try to find, you know, what you're looking for, why don't you try to Google it, why don't you try to find an answer in your textbook, you know, something like that rather than running around a million different places, you know, that is a such a wonderful aspect of it since I'm one person,	Independent Research
they can really help themselves	Help themselves
I think they have leaps and bound of advantage. If they use it,	Advantage over other students
they're not focused on what they need to be doing, they think oh it's on the iPad, I'll just do it later	Not focused on class
if there was a way to make an iPad or a piece of technology where it was just completely, you know, like the teacher got to pick which app you needed to on and then the teacher got to kind of monitor in that way I think that will be awesome,	Too much autonomy
Like I said, I think I take more of a like, I think took a step back to be like alright you guys doing more things on your own now,	Teacher step back
I can literally just say like I said of somebody has their hand up and I know that I can't get to them in the next five minutes I can say to them, alright do me a favor do some research on your iPad and, you know, tell me what you know,	Independent research
in certain aspects definitely more manageable	Classroom is much more manageable
I think it the student needs to be more self-sufficient and responsible for their own learning at this point.	Need more student responsibility
they have an option,	Students have options
they had to have the ownership and the responsibility themselves to make sure that they don't hit that button.	Responsibility, Ownership
I can do all that on the iPad	Can do everything on iPad

Teacher 3 (T3)	
flipped class models where they're doing their actual kind of learning at home	Flipped classroom
when they do an internet search	independent research
it gives them the freedom to really explore something	Freedom
with the iPad they can watch videos, they can see an animation of how these things are actually moving around, how they interact and that's a big advantage.	Big advantage
I step back a lot and let the students work on their projects.	Teacher steps back
okay I want you to make a video showing me this.	Students create
So I would argue for more freedom on the iPad that I think would be okay.	More Freedom
my job now is more to help them find the information and help them make sense of it and to put it all in the context rather than just telling them the answer.	Teacher as helper
I see students working with Google Docs on projects to get one document that they can all edit at once.	Students work in groups
we can bring in the wealth of information that's out there and we can kind of teach them how to be more discerning about what they read or what they take as truth.	Wealth of information
I will say that students do enjoy doing the projects	Student enjoyment
they like making the movies,	Student Enjoyment
Teacher 4 (T4)	
they use GoodNotes	Different Apps
They have a really, really great note taking system	Take notes
they also use it with video tutorials.	Video tutorials
they watch videos	Videos

concepts that they learned in the video tutorial	videos
So they're very interested in passing obviously.	Interested in their success
there but the need for me, even in my statistics classes were much greater than they are right now	independence
so that definitely has taken a lot of it off of me and the other thing is I have a lot less missed homework assignments.	Less responsibility for the Teacher
I respond to each of their comments individually	Individual attention
they're getting the individual help that they need	Individual attention
my students do not stay after school as much anymore	Independence
that they could look up how to create a frequency polygon,	Independent Research
they're able to do screen casts	Screen Casts
you want to hear what they have to say	
people can view them at their leisure	Independence
With e-Backpack now I'm giving individual comments as opposed to just brushing through and seeing, checking for completion.	Individual feedback
Now that they have the GoodNotes app that has everything that I want and as soon as I was able to get that I knew that it was gonna transform everything.	More responsible students
they're more responsible at home,	More Responsible
I've increased their responsibility but they've willingly taken it on.	Greater expectations
I'm expecting more of them they're expected to be able to not only solve the word problem or whatever but apply to a different situation.	Greater expectations
the responsibility has increased in most ways but more precisely at home.	Increased responsibility outside the classroom
they're learning differently.	Learning Differently Higher level learning

they’re learning more intense problems, they're learning to problem solve versus rote	Problem Solving skills
they’re learning but since the responsibility is greater I think that they're learning more.	More Responsibility = more learning
Competency **Teacher 1 (T1)**	
but in some I think it's made them lazy.	Lazy students
There are other kids who’re really good with the technology	Good with Technology
I mean I think they all know how to do the basic stuff	Basic Knowledge
how to take notes, the basic things on iMovie and keynote pages	iMove Keynote Pages
some students will like oh give me your iPad I can do this, this and this for you and I can figure our stuff that, you know even as a Vanguard teacher that I wouldn’t know how to do because they’ve been playing with it at home for their entire lives.	lifelong learning Teacher is Vanguard
some of them come with, you know they can take this thing and do awesome things with it that they couldn’t have done in the past.	couldn’t do in the past
I think they know that are certain things that I can help them with and if I can't I'd admit it,	Teacher can’t do everything
There are some students in class hey can you help someone do this because they're capable of doing it and they understand how to do it.	Students help students
there’s things I can't do, I'm okay with that. I mean I'd like to be able to help them with everything but there’s some stuff I don't know the answers of.	Teacher doesn’t know everything
Now with what we have available they can make videos and present those videos to the class and you know the students are gonna learn about 25 different countries	Students can create videos

if they're motivated and this year's group is a very motivated group that's willing and anxious to learn in their own	Motivation and willingness
They figure things out that we can't figure out.	Students can figure things out
I think it will help but I also think the most important thing that they can learn in high school, and I might get in trouble saying this but, isn't really the content. It's the responsibility that they learn, the respect they learn and the work ethic that they learn through the content.	Learn responsibility Respect and work ethic
But the skills that they learn along the way and one of the skills is technology	Learning technology
Teacher 2 (T2)	
they teach me stuff, you know, like I am really good with eBackpack now	Students teach teachers
I don't get frustrated if they know something that I don't because I just take it as like a learning experience	Teacher as learner
I am very like open to learning new things too,	Open to learning new things
I am like proficient in it but there are a certain thing that I don't like	Teacher is proficient
the kids know I know how you use it, it just like certain things around like well and I feel a little bit over my head here, you know, and then kind of just work it out together.	Some things are over teachers head
take out your iPad why don't you go on purplemath.com and see what they have,	Learning technology
There is no excuse that you didn't write your homework down because it's on the school web	Website access
access to that 24 hour a day	Access
because the book is on the iPad	Access
I find myself trying to come up with more technology kind of activities and things like that I can get them to do, you know, doing projects and thing on poster board is out the window, it's iMovies and Keynotes and, you know, page posters and things like that.	Teacher as learner

overall it could be a very awesome thing that we do and it could be really beneficial for all the kids.	Beneficial for Kids
Like hey look I know something that you don't know and you're an adult and I know and look what I can do and you can't.	Students are proud
It doesn't bother me that they can do things I can't do, I am okay with that.	Teachers ok with students knowledge
I think that as teachers as a whole we need more practice with how to use them and good models of instruction using them	Teachers need good models of instruction
Teacher 3 (T3)	
a lot of the work that they're doing that used to be paperwork is now strictly on the iPad. We do a lot of projects,	Project based instruction
Certainly you know students making movies wasn't possible without the iPad and now that we have it I probably do 3 or 4 a year in each class.	Studetns make movies
can help individual students rather than spending the whole time in front of the class just presenting the material for the first time.	
I think that the students probably should be a little bit ahead of their teachers in terms of using the technology	Students should be ahead of the teacher
I'm always comfortable with students showing me how to do something	Comfortable with students
You know for a lot of iPad issues I'm able to help them, you know I went through the Vanguard Training and a lot of it is you know WiFi is not turned on, they're not hooked up to the right network.	Technology issues
I do feel like they do come to me a lot with iPad questions and a lot of times I'm able to help them. So I think they feel pretty comfortable.	Students are comfortable with teachers
I feel like I am pretty good about getting my way around, I can work all around those problems.	Teacher is comfortable with technology

what website did you find that on because different students will find different answers and will talk about well, you know is that a reliable source, is it a not reliable source.	
without the technology in front of you, you can't really do that type of lesson.	New Lessons
now with the iPad I'm able to go beyond that a little bit and teach them other things.	Go beyond
it can be very helpful for students to stay organized if they set it up correctly and I know some students just have everything in one big folder but there are some students that actually use it to stay organized.	Organize students
Teacher 4 (T4)	
completely flipped	Flipped classroom
response systems	Response system
Socrative and I've also used Adobe Form Central with unit goal, kind of assessing daily learning goals within the big unit goal.	Response system
Algebra I have a video tutorial to go along with every single lesson that I teach throughout the year, most of them are me, some of them are other people	Video Tutor
With the utilization of eBackpack I now have gained about 30 minutes in every one of my classes	Extra class time
with the video tutorials I think that them hearing my voice inside the classroom and outside of the classroom, you know and basically having my help whenever they need it they can trust that I'm doing everything that I possibly can to help them to succeed.	Video Tutor
they teach me new things everyday	Teacher as learner
You know when it first came out I wasn't comfortable using the technology so I didn't feel comfortable embracing it wholeheartedly. I had to become comfortable with it before I can really figure out how I can use it.	Comfortable with technology

they think that I can answer every question. Some questions I can't but they don't have any, they will ask me anything. I would say 99% of the problems I can help So I know ways around it but I won't help them get there obviously because I don't want them to have that knowledge but yeah. I would say I'm pretty confident that I know a lot of it.	Teacher is confident
Yes and I actually piloted the iPad and GoodNotes in my grad classes because I wanted to see, well if I'm going to ask my students to fully commit	
I take probably about 4 hours to create a 20 minute video	
his is my first year completely flipping	Flipped classroom
They know that they need at least 25% charge coming into my class	
say I'm at 90% I would say	
Relatedness	
Teacher 1 (T1)	
I still think a lot of students still need that, the human contact that they don't get just looking at their iPad	Human Contact
I think they still need that personal touch asking questions and understand the information	Personal Touch
I'll help them to explain	
So if they're absent they're able to check that which they don't always do.	
I think that their interest, their interest in things that they're into are more available to them	Their interests are more available
Yeah I mean guess	
I think it's more student driven	Student Driven

I think the conversation that you have now with students is different.	Different conversations
Teacher 2 (T2)	
I don't think it's hindered the relationship between me and the kids in that aspect	Relationship is the same
there's still something with like a one-to-one like personal contact with kids that they appreciate rather than everything digital,	Personal Contact
I think that if you can get to them in a bunch of different ways that's a good thing	Connect with students in many ways
Sometime kids take it for granted and they think even just the value of the their education for granted	Students take things for granted
The Socratic kind of questioning is helpful in the classroom	
Maybe there is an example there for you know while I am helping other people	
it's their choice to sit there and really hone in, it's like I feel like it's more like college level.	Student choice
Do students work together? would like to say yes but there is something that's like keeping me back from saying yes completely fully	Students are not working together
I want to say yes, but I'm going to say no, not really.	
having a complete, I want to be a completed student where they have all facets of education,	Students are well rounded
I'd say in a lot of ways it allows for a little bit more one-on-one time.	1:1
I can get more one on one individualized instruction.	Individualized
It's a symptom of, but I think having the technology in the classroom is really forcing us as educators to not just be giving them the knowledge because the knowledge is there but they want an answer like a date that something happened they can look that up. It's our job now to put that in the context.	Teach context not fact

yes because like I said my job now is not just to give them the knowledge.	
becoming more engaged in the information age since they're surrounded by so much information.	Engaged in information
Teacher 3(T3)	
What kind of interaction with you have with your students the old way, with the making a copy, giving it to your students, they're gonna have to answer problems. What was the interaction that you have between you and your students that way?	More interaction now
T3: It was much less,	
If a student is engaged in what's going on in the class they're going to be doing what they're supposed to be doing.	Student engagement
It's all about engagement in the classroom	Engagement
I don't know that you're frustrated because to me that just tells me that they're non-engaged and that I need to change up what I'm doing because they should, it tells me that I'm not sending the message to them that what they're supposed to be doing is important.	Non-engagement = frustration
I see some collaborations and I see students doing some really good things, I'm not sure we really foster that kind of thing.	Some student collaboration
I don't think that we do enough to really foster that and I'm not sure what we need to do to get that real collaborative work going because they don't know what it means to work in a group.	School does not foster collaboration
I think they're learning more now because I think I'm able to move beyond just the content of the course and teach them other things,	Move beyond the content, learn more
I think anyone who is highly motivated it's a combination of intrinsic and extrinsic factors. So you have to have some of that intrinsic motivation and you know teachers can provide some of the extrinsic motivation. I'm not really sure the iPad really deals with motivation, I can remember okay you know this person, you know these two are really, really good in making movies so I'm gonna split	Intrinsic and extrinsic motivation

them apart. You know this one's always really good at coming up with new ideas to represent things so I pair them with someone who is not as strong at that.	
Teacher 4 (T4)	
we do labs which help explain and extend	Extend learning
a blended classroom	Blended classroom
that doesn't mean that we're not connected.	Teacher always connected
My students email me and I'm always connected with some sort of device and I tell them to email me because I'd rather them ask me a question than give up on the entire assignment	
I think has really strengthened the relationship between me and the students because they can depend on me and I can depend on them to do their best.	Strong relationships now
I have more one-on-one conversation with students.	More 1:1
I have more time to go around and ask them how do you feel about this.	More time
Because they're engaged. If they're engaged they're not gonna venture off on to something else.	Engaged
So if you can't beat them you have to join them so I engaged them using the iPad so that they can't venture off.	Engaged
it enables me to have group projects	Student collaboration
So when I do things like that I would say they are learning from each other	Student collaboration
In math it's hard to, I think it's a little bit more difficult to kind of pull together all the time and like a history class or a language class where you're trying to bring in interpretations and things like that	
learning from each other I'm not sure, I'm not really sure that they are learning as much from each other but I think that they're just becoming more independent thinkers, more than depending on others to help them.	Not learning from each other

I did transform my teaching into more application based Now seeing the improvement of my students and the ample amount of class time that I have as compared to what I had I would have a really hard time ever going back.	Application based learning Students improve Ample class time

Appendix F

Second Cycle of Pattern Coding

	Autonomy		Relatedness		Competency
3	"Student Driven"	1	Human Contact	3	Good with Technology
1	You "the student" finds it	1	Personal Touch	2	iMove Keynote
5	The student is doing new things	1	Personal contact	1	Pages
5	Have new materials	1	Connect with students in many ways	2	lifelong learning Teacher is Vanguard
1	"Independence" "Trust"	4	Students are not working together	1	couldn't do in the past
3	Improved work ethic	1	1/1 teacher/student	3	Teacher can't do everything
1	Independent Research	1	Individual instruction	1	Students help students
1	Independent Research	2	Engaged in information	3	Teacher doesn't know everything
5	Greater Access	3	More interaction now	1	Students can create videos
2	Students are responsible	2	Student engagement	1	Learning technology
1	Independence	2	Engagement	1	Students teach teachers
3	Teacher monitor	2	Non-engagement = frustration	1	Teacher as learner
4	Student find information on their own	3	Some student collaboration	3	Open to learning new things
4	Student finds information on their own	4	School dos not foster collaboration	1	Teacher is proficient
4	Choice in where to find information	2	Intrinsic and extrinsic motivation		
2	Student responsibility	3	Blended classroom		
2	Student responsibility	1	Strong relationships		
1	Student Independence				

3	Student driven		with students	1	Some things are over teachers head
5	Greater access	1	1/1 teacher/student	2	Advanced Lessons
1	Independent research	2	Engaged	3	Teachers ok with student knowledge
4	Student Freedom	2	Engaged	1	Teachers need good models of instruction
3	Teacher stepped back	3	Student collaboration	1	Project Based
3	Teacher monitor	3	Student collaboration.	3	Students make movies
1	Independent Research	2	Motivation and willingness	1	Students should be ahead of teacher
1	Help themselves	1	Individual attention	2	Comfortable with students
3	Teacher step back	3	Students work in groups	2	Students are comfortable with teachers
1	Independent research	2	Student enjoyment	2	Teacher is comfortable with technology
4	Students have options	2	Student Enjoyment	2	New Lessons
2	Responsibility Ownership	1	Individual attention	3	Organize students
1	Independent research	1	Individual attention	2	Flipped
4	Freedom	1	Individual feedback	2	Student response systems
3	Teacher steps back			3	Student response systems
4	Students creates				Video tutor
4	More Freedom				
3	Teacher as helper				
2	Less responsibility for the Teacher				
1	Independence				
1	Independent Research				
1	Independence				

1	More responsible students			1	Video of teachers
2	Increased responsibility outside the classroom			1	Video of teacher
2	More Responsibility = more learning			3	Student teaches teacher
3	Student driven			2	Comfortable with technology
4	Student choice			3	Teacher doesn't know everything
2	Students can figure things out			3	Teacher as user
1	Independent research			2	Can do everything on iPad
1	Students Independence			2	Flipped classroom
2	Student Responsibility			2	Different Apps
2	Learn responsibility				Video tutorials
1	Students Independence				Screen Casts
2	Student Responsibility				Higher level learning
5	Access				Problem Solving skills
5	Access				Teacher is always connected
3	Teacher guides student				
	1. Independence 2. Responsibility 3. Student Centered 4. Student Freedom 5. Greater Access		1. Indiv. Contact 2. Engagement 3. Collaboration 4. No collaboration		1. Teacher learner 2. Tech changes Ed. 3. Students savvy

Appendix G

Results from Student Questionnaire

1. Now that I am using the iPad, I have a better relationship with my teacher than before the iPad was introduced?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12	51	95	41	8
2. Now that I am using the iPad, I have a better relationship with my classmates than before the iPad was introduced?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11	57	79	47	13
3. I know more about iPad technology than my teacher and that affects our relationship in the classroom?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5	63	72	50	17
4. I would enjoy class more if the teacher knew how to use the iPad appropriately?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15	54	64	52	23
5. The teacher has the ability to support my learning on the iPad?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8	13	58	104	24
6. It frustrates me when the teacher does not use the iPad appropriately?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
20	60	66	38	23
7. The teacher assigns challenging assignments using the iPad?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11	50	83	50	13
8. It is no longer necessary for the teacher and I to have interpersonal relationship because of the iPad?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
40	89	51	21	6
9. The teacher places no restrictions on my use of the iPad in the classroom?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
63	87	29	19	9
10. Now that I use the iPad for educational purposes, the teacher is no longer important?				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
103	66	21	8	9