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Technology Integration Does Work: A Case Study of Technology Use in the Daily Work of the Mary Scroggs School.

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Technology Integration Does Happen:

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Abstract

This dissertation study sought to understand certain organizational conditions and administrative practices that may have facilitated technology integration in schools and supported it long term. Offered is a literature review covering the predominant topic in the field, that of the failures associated with computers in schools at all levels. Much of the literature tends to fault the instructor and largely ignores the institution. Key aspects to be noted in this study are the evolving relationship between technology and the work of schools, the teacher as an employee of the institution, and the teacher as a knowledge worker. Rather than viewing the instructor as a stumbling block to the inclusion of technology, this investigation focused on the organizational conditions and practices that may be of importance in a successful school in what could be viewed as the new work of the teacher. The emphasis is on those conditions and practices that facilitated integration in one exemplary public elementary school in North Carolina. Instructors and staff appear to have done what few manage: integration of technology into their daily work and that of their students. A single case study using the methods of Yin (2009) and Stake (1995) was chosen due to the uniqueness of the success studied. The conclusions note that the success is likely based on 3 administrative practices: money and resource allocation, decision-making, and recognition, combined with 3 organizational conditions: work arrangements that favor knowledge work, classroom organization based on *differentiation*, and the school's reputation.

Keywords: technology integration, success, computers, Internet, SMART Board, laptop, teachers, technology coordinator, knowledge work, change, organizational conditions, administrative practices, differentiation, qualitative, single case study

Technology Integration Does Happen:

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Chapter One

Introduction

Technology and Internet is prevalent in everyday life in most every corner of the world. In the workplace, it has been easily integrated into all aspects of business from office work to retail sales, in health care, and in virtually every profession. We can buy a pair of shoes online, purchase groceries and have them delivered to our home, reserve or renew books at a public library, schedule an appointment at a hair salon, design a home, reserve a hotel any where in the world at the lowest published price, or make a request to have a prescription refilled at a pharmacy. We can interact via web cameras with friends or strangers in far away lands, have a virtual psychotherapy session with a qualified professional in another state, share music or play games with others we do not know who have the same interests even in other countries, and watch a full-length network television show and discuss it with people we've never met. Yet, it would appear that schools have not had an easy go at integrating technology into their daily work even 20 years after computers first arrived in many classrooms.

Spending on computer equipment, software and technical support staff in schools is reported as being at an all time high (Anderson & Dexter, 2005; Cuban, 2001) though it would appear from the literature that issues related to the integration of computers into the work of teachers are complex and that integration is not happening. What is meant by the *integration of technology*? Technology should fundamentally alter the way teachers teach and the way students learn. Technology integration does not simply make more

efficient, reinvent and/or reinforce more traditional practices such as blackboard/chalk teaching and paper/pencil student drill-based activities (Eteokleous & Laouris, 2005). It rather transforms teaching and learning by disbanding traditional practice, not simply creating a more "technologized traditional classroom" (Zhong & Sheng, 2002).

After all, twenty-first century students are expected to join the workforce or attend college with a certain understanding of how to utilize computers. The *No Child Left Behind Act* (NCLB) of 2002 suggested that all graduating eighth grade students entering high school be able to use a computer with its most basic functions. Technology was suggested in that legislation as a resource for both teaching and learning. Even as early as 1983 there were federal recommendations that high school students in the U.S.A. fulfill requirements in computer science (A Nation at Risk, 1983). More recently a New Media Literacies Curricula has been designed to include more technology in teaching and learning (Palfrey & Glasser, 2008). However, most of the literature to date on technology integration leads the reader to believe that it is simply not happening on a large scale.

The majority of publications highlight the failures of technology as integrated seamlessly into classrooms in the United States and other countries as well. It has been documented by major authors like Cuban (1986), Fullan (2001) and Hargreaves (1994) that teachers and schools are slow to pick up on innovations. Yet technology exists in most every other aspect of life. Computers and even basic computer usage and Internet functions however have still not been comfortably integrated into classroom education in the way the overhead projector has been. What's the delay?

Statement of the problem

The issue at hand is not lack of computers; it is that they appear to not be actively used in traditional face-to-face teaching. Nonetheless, this is not a new concept. Cuban (1986) gives a historical perspective on the issues concerning adding earlier types of technology to schools, for example instructional TV and radio. Cuban also found 14 years later (2001) that even in high access schools in California's Silicon Valley, a Kindergarten, two high schools and a top-tier major research university, teachers were not actively using technology. Literature to date as of 2010 continues to lead the reader to believe that technology is not being integrated into teaching and learning.

Although it would be nearly implausible to believe that innovative teachers are not doing wonderful, small projects in scattered classrooms and schools across the country, there are few successes school-wide as reported in the literature. In fact, Cuban estimated that less than 2 of every 10 teachers use a computer more than a few times a week in the classroom. Regardless, 8 of 10 public school teachers reported being avid home users of computers (Cuban, 2001). Many experts lauded the prospects of 1:1 laptop programs in schools and are still hopeful. Documented cases like Project Hiller in 2002 and the researchers who have studied it amongst others show that unfortunately these initiatives tend to fall apart at about the 3-year mark (personal communication with Dr. Daniel Light, Feb. 2010). Cuban, who as early as 1986 maintained that computers were "oversold and underused," continues to study 1:1 projects and still holds to the notion that there is little success to report (personal communication with Dr. L. Cuban, Feb. 2010).

If a new teacher were to read all of the literature to date on the topic of technology integration in K-12, colleges and universities s/he would find that the majority focuses on the failures associated with it. Very little if any studies found show evidence of success. The root of these challenges is generally focused on the teacher. The prevalent issues presented in my literature review are various including personal traits associated with people who are attracted to the teaching profession– traits that seemingly pit teachers against technology. Others fault the teachers' lack of training or experience with technology in their pre-service institutions, lack of interest or time to learn technology, lack of collaboration with colleagues, and a disengagement with what administrators hope for and what students need or expect.

Many studies call attention to teachers' inability to cope with technical problems, lack of on-site technological support, and networking issues. Others mention lack of funding for hardware and software upgrades as well as the previously mentioned tech support. Some, though, identify problems as being more leadership-based. Anderson & Dexter (2005) determined a very positive relationship between a principal's daily use of technology with his staff and faculty and those employees' overall use of technology in their work.

However, the majority of the studies tend to identify a large number of factors to blame for the lack of integration of technology into the work of schools, most of those combined with teacher flaws. These are explained in depth in the literature review in Chapter 2 of this dissertation. Cuban refers to these studies as a "menu of explanations" (Cuban, 1986). Although he never specifically identifies what he considers the cause, he tends more to recommend cuts in spending on the technology given its low usage. He

favors more money being spent on school reform. Cuban is one of the few who suggests a closer look at certain organizational settings and practices to understand why computers are purchased and not utilized. Very little other literature nevertheless actually focuses on the institution.

Consequently, "change" literature from Fullan (2001) and Hargreaves (1994) is reviewed in this dissertation to offer an understanding of what role change plays in the difficulty of technology integration in education. Hargreaves (1994) noted that schools as they are known today were created for an industrial society to meet the needs of learners in a factory-like environment in previous centuries. Today's schools are still a maze of cubbyholes and this structure must take on the challenges of post-modernity and its complexities. One of those challenges is dealing with the post-modern employee in the institution. Another is adding technology to the work of those employees and making it sustainable.

In an effort to understand the bigger picture of the institution and its employees, I will also offer a glimpse into the growing field of literature on knowledge work, in particular from Cortada (1998) and Davenport (2005). The idea of the teacher as a knowledge worker will be explored. It could be that work with technology is simply new and different and should be handled differently. For a better understanding of technology change in work, I will focus on Zuboff (1989) and look to the more recent literature from Flores (2006) and Howell Major (2010) regarding technology and specifically adding it to the work of teachers.

Purpose of the study

The purpose then of this study is to gather empirical data from a school that has successfully integrated technology into teaching in order to offer new theories that do not focus exclusively on the teacher. A great deal of studies tend to focus on the instructor and in many cases, as a stumbling block for schools to advance their desire to add more technology. As Kennedy noted, it is not unusual to blame the teacher for failure to implement any type of change in practice (2010). She calls this "teacher attribution error." The notion, nonetheless, is not specific to any certain level of education and in fact is prevalent in studies covering all levels Kindergarten to Higher Education. This dissertation presents the existing literature and examines the overall situation with regard to the instructor and technology integration in educational settings. While the quantity of investigation in this area is growing, a need to focus on the school as an organization, the instructor as an employee of the institution and the new and changing work of those teachers will bring fresh ideas into focus.

This paper does not deny that many innovative teachers exist and are implementing small-scale excellent projects of their own design or are adopting and/or adapting for their own purposes those products made by educational publishers. This paper rather focuses on how committed and innovative teachers can be helped to change their teaching to include technology as one of the tools needed to make such a change. The study examines the working conditions of these innovative teachers and what the institution can do to support them.

Research question

Much has been written on the topic of *organizational conditions* and separately on *technology integration* yet there is a scarcity of studies on the combination of the two. It seems to an outsider that some explanation should be relatively straightforward though, given the copious research on the topic of integration, nothing is feasible in the way of explaining the phenomena. Quite a bit is known about *change* and organizations themselves though not enough is known about their relationship to the successful integration of technology. Thus it appears most pertinent to propose the research question: Which are the organizational conditions that may promote successful technology integration in a school?

First, *organizational conditions* are defined here as school management, practices, and systems (Pedder, 2006). Next, it must be determined what exactly is the working definition of *successful technology integration* in this investigation. We can assume that schools that have successfully integrated technology into teaching would have the following characteristics: (a) when technology that is integrated into face-to-face teaching and/or components of those courses such as labs spawned a change in teaching practice, in other words, moving from traditional teaching to teaching that involves the use of technology for *teaching and learning*; (b) when the technology has been used at least 3 years and there are at minimum locally published reports of its use; (c) when technology is used in at least 20% of the work of teachers in the classroom; (d) when students perceive that the work of the instructor relies in part on technology and it enhances teaching and their learning; and (e) when parents or tech support staff feels the instructor relies in part on technology and it enhances teaching and learning. After a search of 6

months finally one school, and only one school, met this criteria: the Mary Scroggs Elementary School in Chapel Hill, North Carolina. Because only one school among thousands in the U.S.A. met the criteria (including of documentation by outside sources) and responded, may suggest that adjustments need to be made for future studies. But it also assures that Mary Scroggs is a school where technology has *definitely* been integrated to teaching, as will be shown when the school setting is described in Chapter Three.

Significance of study

The study allows for a better understanding of why certain organizational conditions of that school may or may not have contributed to the success of integrating technology. Based on an extensive literature review surrounding this topic as presented in Chapter Two, a short list of organizational conditions was determined. The list would have seemingly been comprised of the most frequent organizational facets mentioned in the literature. Notwithstanding, there were a few others that I suspect to be important. Those were studied as well, in particular organizational aspects arising from the literature on *knowledge work*. Other environmental factors were likewise observed and were kept in mind when patterns emerged.

This investigation hopes to be significant to improve practice and also to suggest future research. The organizational conditions of schools have been greatly understudied with regard to integration of technology into the work of teachers and schools. Currently the studies concerning the integration of technology are largely based on the teacher and are ignoring the issue of *knowledge work* and the organizational conditions that allow for it. The assumption in this research project was that some of these organizational

conditions as well as administrative practices are to blame when technology is not integrated into teaching. Now that a successful school was found and studied, the conditions can be better understood. I assume that these findings will contribute to helping schools integrate technology faster, easier, better and less expensively.

It is to be noted that this study centers on schools that are not employing distance education in the majority of their courses or in a purely online fashion. The idea to limit myself comes primarily from my preconceived ideas based on experiences having taught in only two formats: either (a) face-to-face classrooms or (b) in hybrid courses that incorporated technology in a required but separate lab-like situation. There is some overlap with purely virtual work as will be shown yet in many ways they are altogether different beasts. One will note though that literature from solely online teaching is included when applicable and helpful. The focus of this study is on traditional schools with traditional face-to-face teaching and learning.

Structure of the Dissertation

Chapter One introduces the reader to the recent historical perspective on the state of the inclusion of technology in the classroom in all levels from Kindergarten to Higher Education in the American educational system. It defines terms with regard to *technology* and *integration* and defines those related to what is being looked at in this study, for example *successful* technology integration as I have proposed it here.

Chapter Two offers a literature review on the main topics associated with the lack of technology integration in schools. Most of these topics are either of an organizational nature or are associated strictly with the teacher. Some studies overlap the topics. In general, these works fall into 3 determined categories: (a) warnings regarding the

limitations of technology in schools; (b) the work of teachers with regard to technology integration within the organization; and (c) organizational conditions and administrative practices that either facilitate technology integration or those that impede it. Chapter Two continues with an overview of literature from the field of Organizational Theory and Change applied to education, much of it coming from Fullan (2001) and Hargreaves (1994). It continues with a look at literature emerging from the field of *knowledge work*, a relatively new body of work rarely discussed with regard to the work of teachers. It presents a glimpse at the fundamental organizational conditions that facilitate the best practices in this area. Some of these are applicable to what Flores (2006) refers to as the *new and changing work of teachers*.

Chapter Three discusses the research method. It explains the nature of the qualitative approach and why it was chosen. Subsequently, the reader will note the same for a single case study, a definition and a justification for its choice. The chapter continues by documenting the lengthy process surrounding the search for a school to study. It was in fact the difficulty of the search that seemed to justify a single case study. Chapter Three explains the setting chosen for the study – the Mary Scroggs Elementary School in Chapel Hill, North Carolina, the key participants, and gives a brief overview of the current technology situation at the school twelve years since first opening. The chapter also outlines step by step the chosen method of obtaining the data. Due to the school being a physical distance of 2,500 miles (3,900 kilometers) from the researcher, a hybrid of initial online interviews combined with follow up face-to-face interviews and direct observation on site was utilized. Chapter Three then concludes by highlighting what data was collected and how that evidence contributes to the study.

Chapter Four presents the findings regarding the organizational conditions and administrative practices that appear to have significantly contributed to the integration of technology at the Mary Scroggs School as well as those that are likely to have promoted the long term success of the effort. The discussions surrounding the findings suggest that the success is likely based on 3 administrative practices: money and resource allocation, decision-making, and recognition combined with 3 organizational conditions: work arrangements that favor knowledge work, classroom organization based on the practice of *differentiation*, and the school's reputation.

Chapter Five presents conclusions based on the findings presented in the previous chapter. Equally it presents practical implications regarding the findings and the work of schools and lastly, it highlights what implications for future research have surfaced based on this dissertation and its findings.

Chapter Two

Literature Review

The methodology for this review tended to center on organizational issues surrounding technology integration into schools of all levels, computers, Internet or web-based instruction, and the role of the instructor in all levels of education K-12, colleges and university, primarily in the U.S.A. Keywords included: education, faculty, teacher, instructor, perceptions, attitudes, impediments, barriers, deterrents, and success, paired with work, knowledge work, institution, organization, change, innovation and/ or integration, online, Internet, web, computers, and technology amongst others.

Overview of Literature

There is copious and wide-ranging literature covering the topic of technology incorporation. Due to the enormity of literature relating to technology, this investigation looked specifically at adding technology to traditional courses and classrooms and excludes most but not all literature covering purely distance-based courses. Here, a general overview of the categories is first presented. Each will be discussed in much greater depth in the subsequent section titled "Findings." The focus though is on organizational issues relating to integration. It should be noted that the topic of integration is complex and multifaceted, often resulting in even more complex theories that are as Cuban put it, "a menu of explanations" as to why technology is not being integrated (1986). After an extensive literature review, I concur that this is still the case today in 2011. Sorting through the theories, in particular pointing to the woes and failures, is a bit like playing with a Rubik's cube. In an effort to see what is inside the cube with its ever-changing interconnected parts, I have attempted to choose articles

whose main point is in some fashion *organizational*. The literature has been classified then into three major categories. Those are: (a) warnings regarding the limitations of technology in schools; (b) the work of teachers with regard to technology integration within the organization; and (c) organizational conditions that either facilitate technology integration or those that impede it. It becomes clear, however that there is quite a bit of overlap between the categories owed to the fact that most authors offer a multi-faceted explanation for the failure of technology in the classroom.

Warnings Regarding the Limitations of Technology in Schools

In the wide-ranging literature covering technology integration, the problems and failures associated with it are ever-present and by far the most common theme. Earlier studies were not quite so bleak. They did, however, present legitimate warnings that technology would not be a placebo to conquer all problems in education (Cuban, 1986; Burbules & Callister, 1999; Saunders & Klemming, 2003). Cuban's 1986 publication pointed out the history of technology in education and relates earlier forms like instructional TV and radio to the more current introduction of the computer to classrooms. He notes the "strikingly uniform pattern of occasional teacher use of all kinds of machines" (pp. 52). He wondered whether computers would achieve a different level of usage.

It remains an active topic of concern in the field in particular what one author calls the "Wow factor" of new technology (Davis, 2008). In other words, like the authors noted above, Davis speaks to the perception that technology is not an answer to all problems yet the excitement of new additions like streaming video is contagious and often times very compelling. Whether said technology becomes integrated into what

Flores refers to as *the work of teachers* and *the work of students* is another story (personal communication with E. Flores, January, 2010).

The Work of Teachers with Regard to Technology Integration Within the Organization

Another group of articles focuses more on the work of teachers within the organization. Flores (2006) highlights the changing work of teachers since integration of technology and points out the need to view the teachers' work as new and different. In this paper, it will be shown how some researchers conclude that the organizational attitude affects their technology integration (Adamy & Heinecke, 2005; Passmore, 2000; Finley & Hartman, 2004). Others suggest the critical nature of collaboration with key tech supporters and its absence as the cause of failure in the integration of technology by teachers (Davis, 2008; Adamy & Heinecke, 2005). Quite a bit of research also discusses the interplay between lack of integration and lack of reward/recognition for faculty, and in certain cases primarily with regard to college teaching, overlapping with intellectual property concerns (Passmore, 2000; O'Meara et al., 2003; Ensminger & Surry, 2002, 2008; Ensmigner, Surry, Barry, Porter & Wright, 2004; Adamy & Heineke, 2005; Conceicão, 2006; Maguire, 2005; Finley & Hartman, 2004).

A handful of studies with a more optimistic tone yet a similar message focus on *conditions* that *facilitate* or *sustain* technology integration rather than ticking off the negatives. One recent, comprehensive literature review by Howell Major (2010) synthesized the findings of nine other studies concerning faculty using online technology for purely online courses. Although the emphasis of my study tends to focus on face-to-face teaching, Howell Major presents an important look at the positive side of technology in teaching, albeit online. Her conclusions seem equally applicable to the face-to-face

classroom. She suggests that those teachers who have been able to *deconstruct* their former teaching and *reconstruct* another type of teaching for purely online classes do report some successes. Those changes include: recognizing a change in their roles as faculty, restructuring their courses to be more organized and perhaps more rigid, and accepting and assuming new responsibilities. The later implies that faculty must be able to manage students' technology and troubleshoot their problems or lead them to the proper experts for correction. Likewise, faculty needs to see that their conception of time and how they use it must shift.

Howell Major also concludes that the organization must support faculty teaching online in the following ways: (a) experts need to collaborate with faculty as their roles shift; (b) institutions need to encourage creativity in online teaching as to not end up with "canned" instructional experiences; (c) they must also provide time management support for the changing needs of teachers; and lastly (d) facilitate instructors' changing relationships with students.

Zhao, Pugh, Sheldon & Byers (2002) found factors that they felt made significant impact on what they call the "complex and messy process of classroom technology integration." They focus on these 11 issues: (a) the innovator (teacher) and his/her proficiency with technology; (b) pedagogical compatibility of the technology; and (c) the social awareness s/he has with peers and school administrators. Zhao et al. also looked at (d) the innovation itself, how difficult it was to implement; (e) how it fits in with school culture; (f) the distance from existing practice at the school; (g) what available resources were at hand. They also pondered (h) teacher's dependence on others and (i) the technological infrastructure, along with (j) the human infrastructure. Lastly they

encourage (k) teacher education programs to look beyond a skills-only approach and to focus more on the interplay between the aforementioned conditions. The authors admit that many of the 11 factors had been previously and extensively studied nonetheless they propose that it is the interaction between the conditions that is truly significant. Like Fullan (2001), the researchers in this study propose small evolutionary steps instead of more revolutionary activity.

Ensminger & Surry (2002, 2008) and Ensmigner et al. (2004) in three correlating studies also ranked eight conditions that they felt facilitated technology integration. The authors compared the results across three types of organizations: K-12, Higher Ed and business. Those eight factors were: (a) resources, (b) skills and knowledge, (c) time, (d) dissatisfaction with the status quo, (e) participation, (f) reward, (g) leadership and (h) commitment. The most recent study showed that the institutions ranked the conditions differently and that a "one-size-fits-all" approach is not prudent. However, they made no significant changes to the conclusions based on the original eight conditions they studied.

In a study of international schools concerning sustaining innovations with technology, Owston (2007) agrees with Zhao et al. (2002) and Ensminger & Surry (2002, 2008) in some aspects, for example, difficulties in diffusing innovations and proximity to schools' culture and teachers' existing practice, though he argues that reliability of technology is not as big of an issue as some lead us to believe. Owston rather emphasizes more the importance of the support of those he deems to be the key players including the principal and students. However first and foremost he singles out teacher support for the innovation as the key component to long-term sustainability. He includes the critical nature of positive attitudes from the teachers and perception of the value of the

innovation. He advocates involving teachers in the process from the beginning and including acknowledging how the innovation can help students. He suggests regular professional development and opportunities for sharing with colleagues.

Lastly, but by far the most commonly presented theme, is that of *barriers* and *impediments* to integration of technology. Some barriers are made known in articles with an institutional focus as mentioned in previous paragraphs such as lack of opportunities for collaboration, resources or reward (Schrum, 1995; Zhao & Cziko, 2001; Adamy & Heinecke, 2005; Finley & Hartman, 2004). Still further barriers are perceived as social such as tensions in the organizational culture of the institution (Heflich, 1998), an uneven distribution of social capital (Frank, Zhao, & Borman, 2004) or improper collaboration with key tech players (Adamy & Heinecke, 2005).

Organizational Conditions That Either Facilitate Technology Integration or Those That Impede It

With regard to facilitation of technology integration, in her review Howell Major (2010) as noted earlier, credits those teachers who have been able to deconstruct former teaching in the classroom and reconstruct a new type of teaching. She noted successes in the shift but does have suggestions for the institution such as collaboration with experts, encouraging creativity in online teaching, provide time management support and provide support for the changing relationship with students.

Anderson and Dexter (2005) investigated technology leadership as a school characteristic in more than 800 K-12 schools in the U.S.A. They showed a positive correlation between school leaders who actively use technology in their work even if only email with teachers and staff. They concluded that principals who expect technology

integration in their schools must employ it themselves and, in fact, this was the variable with the largest correlation to technology success in their study.

Yet another group of articles with the organizational focus addresses physical and institutional impediments placed on teachers, barriers to creativity and teaching as they may please with computers and Internet. These roadblocks include filters placed on technology used in schools or an intentional cut off of Internet in classrooms by administrators (Bell, 2004; Mullen & Wedwick, 2008; Schneider, 2009; Kafai, Scott Nixon & Burnam, 2007; Palfrey & Glasser, 2008). Additionally, a constant in the overwhelming majority of the studies mentioned in this paper includes computer crashes and other technical glitches (e.g. Cuban, Kirkpatrick, & Peck, 2001; Cuban, 2001; Maguire, 2005; Ensminger et al., 2004; Piotrowski & Vodanovich, 2000; Pajo & Wallace, 2001).

Given that so many studies here are in essence laundry lists of problems and explanations, several remaining articles overlap the impediments into groups faulting both the institution and the instructor or present an extensive review on these overlapping barriers (Maguire, 2005; Ensminger et al., 2004; Piotrowski & Vodanovich, 2000; Pajo & Wallace, 2001; Finley & Hartman, 2004). Those also include the use of filters and the lack of Internet in classrooms. Yet most stopgaps tend to be lumped into the category of more psychological impediments such as personal and attitudinal barriers relating to the instructor (Maguire, 2005; Piotrowski & Vodanovich, 2000; Pajo & Wallace, 2001; Zhao et al., 2001; Zhao & Cziko, 2001; Mitchell & Geva-May, 2009; Davis, 2008; Ensminger et al., 2002; Conceição, 2006).

Findings

There is a wide range of literature covering this topic that has been generated in the past decade thus this study intends to focus on the work of the instructor as a technology integrator within the organization and how the literature views them. Most research continues to point the finger of blame to the teacher. Zuboff (1998) wrote about change theory as related to technology of all types in her classic "In the Age of the Smart Machine." Although teachers are not mentioned specifically in her work and she does not focus on this issue in great depth, Zuboff does admit that in a knowledge-based profession, some people excel while others with the same skills and preparations do not, due to what she calls "characterological impediments." (I will return to Zuboff in a later section and see her assumptions related more specifically to technology and newly formed skills in those workers who do not fit this category.) Plentiful studies generated in the past decade coincide in their arguments that the instructor may suffer myriad personal impediments to the uptake of new technology.

Personal impediments include preconceived faculty notions about the proclivity for misuse of technology for example, students' possible misuse of chats incorporated into college courses (Kirkpatrick, 2005) as well as students' diversion in misuse of forums in courses for the posting of frivolous comments and materials (Williams, 2002). In both of those cases nonetheless, it was shown that neither was an issue, or if so, for example in the case of the forums, the non pertinent comments ceased to be a disturbance after the first few weeks of the course.

Pajo & Wallace (2001) studied the barriers to the uptake of web technology in a university setting. One of the major factors reported as a barrier was *time* – time to learn,

plan, keep up and monitor all angles of the new technology. This coincides with many reports including Cuban (2001) and O'Meara, Kaufman & Kuntz, (2003). Nonetheless, Pajo & Wallace, unlike Cuban and O'Meara, et al., concluded that aside from the issue of time, most barriers were preconceived and of a personal and attitudinal sort, and that they did in fact inhibit technology integration more so than other more institutional barriers. They identified these stopgaps as preconceived lack of skills and training along with ideas of inadequate funding and lack of technical support. Pajo & Wallace conclude that these themes were also strongly reported throughout the literature they had studied on the discrepancy that exists between expected technology use and actual use.

Other studies discuss teachers' fears about what younger students may do with the computer if not under teacher control at all times (Zhao, et al. 2001). The same researchers point out that the computer is viewed as the "teacher's machine" by many instructors, generally thinking of it as a tool to help them in their own work such as to organize grades or as "fancy chalkboards" to make presentations more attractive (Eteokleous & Laouris, 2005). Cuban (1986) observes that teachers use computers to supplement their teaching, not to change it. The consequence according to Cuban, Zhao et al. and many others is a movement away from the intended goals. Students are still primarily using the computer for drill practice, key boarding and to print essays they produce or could easily produce with paper and pencil. Thus, it is noted that teachers are actually restricting students' learning while using the computer. Zhao et al. (2001) present the case of a program called KLICK! in which students designed their own learning in the after school program, but this was not at all the way the educators had perceived the computer use at the beginning.

Windschitl (1999), like Saunders & Klemming (2003), feels that teachers are not adapting their teaching to new technology. Windschitl agrees with Zhao et al. (2001) and proposes that teachers are struggling to develop pedagogy to keep up with the rapid advances in technology and students' emerging learning styles, in particular collaborative learning, much like the KLICK! program described by Zhao at al. Typically teachers try to use their existing materials and somehow make the Web fit into those, for example, assigning work involving gathering information from the Web. Windschitl offers a glimpse of how teachers are attempting that fit and not making it work. He suggests teachers develop what he calls progressive instructional practices, or in other words, activities in which student learning takes place along the path to a task rather than simply getting to a task and coming up with an answer.

Several literature reviews of articles in teacher pre-service journals focus on the teacher's lack of skill or perceived lack of skill as a reason for resisting new technology (Maguire, 2005; Piotrowski & Vodanovich, 2000; Pajo & Wallace, 2001). However, Cuban (2001) argues though that teachers are not afraid of technology and in fact use it regularly at home. The teachers in his study in three levels of education (Kindergarten, High School and university) report in surveys that they wish they could learn additional tasks and use more technology in school.

Mitchell & Geva-May (2009) attribute the lag in faculty acceptance to intellectual reluctance, support, change and cost-benefit to the teacher. These, they assert, are in conflict with what seems to be a trend in administrations accepting the idea of computer technology. Zhao & Cziko (2001) agree that while many studies blame a lack of teacher training, it is actually a perceived idea that they do not need the technology. Zhao &

Cziko take a critical look at the situation from the inside out in an effort to explain why teachers are not using technology in their teaching. Their study on what they call PCT (Perceptual Control Theory) indicates that teachers' own goals are in conflict with the integration. If teachers do not have the need for technology, they will not integrate it. This type of attitudinal barrier is commonplace in much of the more recent literature (Maguire, 2005; Piotrowski & Vodanovich, 2000; Pajo & Wallace, 2001; Zhao et al., 2001; Mitchell & Geva-May, 2009; Davis, 2008; Ensminger et al., 2002; Conceição, 2006; Finley & Hartman, 2004).

In an extensive literature review, Maguire (2005) studies barriers and motivators. She reports that the list of those is in fact lengthy. Many positive motivators were intrinsic such as the intellectual challenge, the personal motivation and satisfaction. Extrinsic motivators would also be tenure and promotion. Inhibitors on the other hand were greater than motivators but according to the faculty, Maguire said they reported them as being institutional and not personal. It should be noted that Maguire reports that much of the fear and inadequacy about technology as well as the idea that it is of lesser quality or may some day replace face-to-face instruction altogether was mostly noted by faculty who had not actually used technology to any extent. Maguire also reported that the faculty she surveyed as well as the studies she looked at most frequently mentioned a lack of technical support as a huge deterrent.

Piotrowski & Vodanovich (2000) studied the reported barriers to Internet-based instruction via a literature review. They concluded that there is only limited support for the reported barriers and they are actually partially anecdotal rather than completely true. They categorized the obstacles in four ways: first, institutional, such as financial support,

and reward; secondly, instructional, such as time vs. workload and collaboration with colleagues; thirdly, technical such as reliable equipment and proper software; and lastly, personal such as competence and attitudes. Their conclusion based on a literature review was that the research does not support some of the myths surrounding problems with Internet-based usage and that indeed some of the issues thought to be problematic were myth. They found "pros" to be: reliable equipment and access, positive views from students, a gradual increase in proficiency with computer usage and in general, positive attitudes from faculty members.

Thus personal and attitudinal barriers coupled with and often directly in tandem with institutional impediments such as lack of time, lack of funding, tech support personnel, training and mentoring, true or partially a myth, could add up to a lack of technology being used in education. Most of the up-to-date research covers those presumed impediments thoroughly, including a tendency to see the instructor in some way as a roadblock. There is no denying that these impediments of all types exist to some measure and this study does not purport to prove otherwise. However, as Passmore (2000) tells it, the instructor is not always the problem.

Passmore believed there was an incorrect assumption that the teacher is the "bottleneck" of innovation in schools. There are a few studies agreeing with Passmore, although not many. For example, Bauer & Kenton (2005) coincide in theory by their estimate that even very few tech-friendly teachers are using any technology at all. They found that 30 highly skilled teachers were in fact innovative and adept at overcoming obstacles but simply did not use the technology. They report that of 80% of those teachers surveyed who felt they were "tech savvy," were chosen in purposeful sampling

after being reported so by their supervisors, had technology in hand, and likewise reported using it at times, only 50% of the time was it really being employed. This is not unlike Cuban's observation that that less than 2 of every 10 teachers uses a computer more than a few times per week in the classroom although 8 of 10 public school teachers report being avid home users of computers (Cuban, 2001).

Palfrey & Glasser (2008) agree with Passmore. They stress the importance of schools needing to incentivize and reward experimentation by teachers. They also emphasize the need for schools of the future to have faculty of the future. Palfrey, who teaches at the exclusive Harvard Law School, states that although Harvard has invested significant amounts of money into technology no one has shown him how to apply it to his teaching. He does not advocate the use of costly outside consultants rather he advocates the use of informal collaboration with the more tech savvy faculty members within one's own department. Palfrey & Glasser recognize the limits of teacher time and believe this is something that needs to be addressed.

A recent article by Kennedy (2010) focuses on teacher attribution error. Kennedy who does not actually address technology directly at all feels teachers are blamed for much of the failure to implement any type of change in practice due to an attribution error. Kennedy faults the organizational conditions of the school which include lack of time for preparation, the over scheduling of teachers, frequent interruptions in their classroom, bad textbooks, the physical space, a general lack of resources, and what the author calls *reform clutter* (Kennedy, 2010). In a previous book, Kennedy refers to this set of conditions as the circumstances of teaching the prohibit teachers from changing their practices (2005).

Moving from the teacher to the administration, in a study of school leadership and its relationship to technology integration, Anderson & Dexter (2005) refer to "technology leadership" as a characteristic of a school. They studied 800 K-12 schools in the U.S.A. and determined technology-related activities that may have had some importance. They found that there was an overwhelming correlation between a principal's use of technology in his or her daily work, even if only using email with teachers, and that of overall technology integration in the school. In fact, it was so prevalent that they identified this as the primary activity that determined whether teachers did or did not actively use technology. Although there were some limitations in this study with regard to exactly how the teachers were using the technology (e.g. were they shifting toward more student-centered projects or simply doing old tasks a new way?), this is a factor that should be considered when developing interview questions for this study.

The remaining literature researched for this paper and covered more extensively in the subsequent section, will be composed of works on *organizational change* and *knowledge work*. Fullan (2001) examines change in relation to schools. Hargreaves (1994) and Ingersoll (2003) have also contributed to this topic extensively and their notions will be presented. The three authors study change and schools from an organizational focus.

Zuboff (1988), as stated earlier, points out that although some people may suffer some sort of characterological impediment to using new technology, it is most often that technology forces production of new patterns of both information and social relations. She concludes that technology substitutes new skills where a lack of social relationship exists. So although some workers using technology find that their social skills diminish,

they generate new skills to manage their new work. Howell Major (2010) and Flores (2006) agree.

Cortada (1998) and Davenport (2005) present the case of the knowledge worker and this new type of work. Cortada extensively researches the foundations of knowledge work and the rise of this class of workers, who they are and how they have contributed to economy and society, another topic to be noted in the subsequent section. Meanwhile, we will look to Davenport who highlights the working conditions under which knowledge workers are thought to function with optimal efficiency and comfort.

Discussion of Findings

Based on the conclusions of Bauer & Kenton (2005), Cuban (2001) and Cuban, Kirkpatrick, & Peck (2001), one could surmise that even teachers who feel they are tech savvy and have technology at their fingertips are simply not using it as they could be. This situation leads to the thought that the problem should be viewed from a different perspective. Perhaps administratively schools are not properly organized for the new 21st century work of teachers and the new work of learners.

The studies in this area appear to be insufficient. If a professional new to teaching were to read through all of the research to date on the issues of technology integration and were to acknowledge each impediment, avoid each pitfall and follow each piece of advice, would s/he be successful at technology integration into his/her own work? Most likely not. *Change* in general is not reported as "successful" and often times it is "messy" (personal communication with Dr. E. Flores, 2009). Flores agrees to some extent with Zhao et al. (2002) in their study of conditions for classroom technology innovations

nonetheless, he feels that their list of eleven factors is rather extensive (personal communication with Dr. E. Flores, 2009).

Zhao et al. tend to not accept much of the other current literature because in their opinion the list is "simply too long," including every possible problem one could encounter in a school setting. Flores states too that often the complex explanation is the incorrect one. Most of what is written tends to explain the problems not the successes because that is simply the nature of change. Are there really so few successful innovations to report? Unlike most, Zhao et al. report some small successes in their investigation, however I find two weaknesses in their report. It should be noted that the information covers a one-year period and offers no insight as to the sustainability of the innovations discussed. Secondly, they state that the list of problems associated with integration is "long" so the current literature does not offer a viable explanation. On the other hand, I felt that the 11 points they make also constitute a rather lengthy list of issues. In an effort to understand more about the topic it would be valuable to consider a few of the fundamental works on educational *change* in general.

Fullan (2001) warns that real change involves shifts in conceptions and role behaviors. It is a slow, step-by-step, non-linear and continuous process, not an event. It is dynamic and flowing with a variety of actors and interplay. Teachers cannot be singled out as the agents of change but in accordance too with Hargreaves (1994), teachers must have a heavy hand in the change process. For Fullan, educational change is technically simple yet socially complex. Thinking of sets of factors in isolation and in a linear way must be avoided. Hargreaves agrees and points out that post-modernity is really akin to a *moving mosaic*.

Fullan indicates that for any change to be successful, there must be continuous discussion and collaboration often well after what administrators may have felt was the initial implementation phase. Fullan points out that many times teachers do innovate and they look most often to other teachers for resources and ideas. Nonetheless, given the traditional egg-crate nature of schools (Ingersoll, 2003; Hargreaves, 1994) in most cases communities of practice, with their collaborative nature, are defeated by the structure of the school itself.

Ingersoll (2003) points out that schools are viewed as an anomaly by researchers from the interdisciplinary field of organizational theory. He believes schools are unique and different and their work is not equal to that of other large organizations that may look similar. Ingersoll primarily bases this notion on control. Some researchers feel teachers are too restricted and do not have enough voice in their work within a rigid structure. Others feel the opposite – that schools are too decentralized. One notion many researchers do agree upon is that schools function in a very insular way and teachers work primarily in isolation with little opportunity to collaborate (Ingersoll, 2003; Hargreaves, 1994; Bidwell & Yasumoto, 1999). Bottom-up planning for a *learning organization* is helpful in involving people in change (Senge, 2006). But regardless of the type of management, schools are simply very insular and modern in their organization. Hargreaves affirms that schools as they are known today were created for an industrial society to meet the needs of learners in a factory-like environment in previous centuries ("modern"). Today's schools are still *balkanized* into a maze of cubbyholes and this structure must take on the challenges of post-modernity and its complexities including integration of technology.

Another concept lacking from current literature is that of teachers and their treatment within the organization as post-modern *knowledge workers*. Cortada (1998) comprehensively researches the class of workers that rose dramatically after World War I, those he brands as *knowledge workers*. Within that class, he includes *educators*. He frequently refers to university *professors* as part of this class and on a few occasions includes the terms *teachers* and *educators*, nonetheless without categorizing the level of teaching, for example K-8 vs. High School or vs. Higher Education. Cortada does reference Princeton economist Machlup who studied this emerging class of workers beginning in 1950. Machlup included *teachers* in those workers he investigated (cited in Cortada, 1998). Cortada specifies that knowledge workers are those who create knowledge, in example a research scientist, and those who apply existing knowledge to new situations, such as teachers and doctors. He tends to reference the teacher as a knowledge communicator. Although it is ambiguous if he is categorizing all types of teaching in the same way, he clearly includes teachers in the category of knowledge workers.

Davenport (2005) outlines issues concerning performance and results from knowledge workers. He favors a high degree of latitude when it comes to autonomy. He alludes to the failures of some top-down practices in business and like Fullan (2001) speaking of the school as an organization, he is an advocate of employee participation in change. Davenport proposes that all knowledge workers need to feel they have participated in the design or redesign of any new process of work.

The problems were most likely present for decades however, as Hargreaves (1994) emphasizes, it is the *intensity* of the work that has changed. One could examine

then if the acceleration of the work that is experienced, above all when the world of fast-paced technology is thrown into the educational mix, is in fact only a magnifier of the greater problems that exist and have long existed in the outdated structure of the school. Currently, the organization is asking the instructor to work in the same way as pre-technology integration – in a very industrial mode with the same work structure, rewards and expected student outcomes as pre-technology. Nonetheless, it would be difficult to advocate the notion that the work cannot be the same because both knowledge work and technology have changed the way we function in all facets of life. Flores (2006), in his study of the virtual professor, much like Howell Major (2010) and Zuboff (1998), presents a strong case to support the notion that the work of teachers has indeed changed and new skills evolve or their development should at the very least be supported.

Equally, the way people learn has changed (Tapscott, 1998; Pletka, 2007; Beck & Wade, 2004) yet the institution expects instructors and students alike to do industrial age work with industrial age results in a fast-paced technology filled world. The instructor must try to balance the pull between the institution's demands and students' needs and outcomes otherwise there is a fear of personal failure, failure to meet state imposed assessment goals, and in the end, fear of losing one's job altogether. The traditional structure could indeed make technology integration almost an impossible task.

When considering teachers at all levels of education in the U.S.A., it could be that they are functioning as employees not only within a structure of an organization that is out of date, but they themselves are, in turn, expected to teach in a similar fashion to meet the pulls of the organization. In other words, teachers may be working within an out-of-

date school structure, in a top-down way, with industrial work conditions. Adding technology to the picture may complicate things even further.

Most all researchers in the past decade seem to favor collaboration as a way to resolve technology integration issues and many of the larger problems of schools. Davenport (2005) reiterates this by reminding organizations that the cost of adding technology to knowledge work is labor-intensive. Not only is the cost in the hardware and the software but also in the time to learn, tinker with and fix the technology. A good portion of this time may be by simply collaborating with colleagues. However, it has been noted by the author of this study that one of the most reported concerns, if not the most frequently reported predicament with tech integration in all literature to date in education is lack of time for already overburdened teachers. For example, Pajo & Wallace's (2001) extensive article is representative of the major issues in this area. The researchers offer survey results of 1,400 staff members at a large Australian university concerning the barriers to uptake of Web-based technology. They report that other than preconceived personal barriers, the primary roadblock identified by teachers themselves was that of *time*. In fact, 3 of the top 4 issues reported in teacher surveys involved time, a lack of time required to learn to use technology, a lack of time to develop a web-based component to a course and a lack of time to use and monitor the technology. With the reported lack of time, collaboration may not be the answer in spite of a great deal of support in its favor.

Including those who support collaboration are Brown & Duguid (1998). But, they corroborate what Ingersoll (2003) noted, that education is typically very insular. They conclude that corporations could not work in similar fashion. When organizing

knowledge workers in companies, they favor collaboration and overlapping hybrid groups to prevent *organizational blindness*. Teaching is not traditionally a cooperative venture as are other types of knowledge work. Brown & Duguid warn that knowledge is "sticky" and is deeply rooted within one community; it moves more easily within a community rather than between them. Thus we can conclude that given the egg crate nature of the schools, knowledge is not flowing as it could. Davenport (2005) suggests a restructuring when it comes to difficulties in managing knowledge workers. Following in the footsteps of management to restructure work may be a path to success for education. Davenport does advise against abrupt methods to do so and like many researchers of educational change such as Fullan, he prefers small steps over drastic ones.

Davenport (2005), like Hargreaves and others, agrees that participation and collaboration are crucial but he makes a good case when he pits autonomy against collaboration. Thus it may behoove administrators to create conditions that favor collaboration without reducing autonomy, a hallmark of teachers' professional character. But is collaboration as important in education as many authors propose? At first glance one would think so. Yet in a small but unique study, Spitzer & Stansberry (2004) study the integration of technology via collaboration and actually conclude that teachers who were non-collaborators had success integrating technology over another group of highly collaborative teachers. The findings showed that the former teachers who were free to make their own decisions about technology and their work truly integrated more technology than the latter more cohesive group. Given that both collaboration and ability to make decisions are features of knowledge work as described here, this finding about

the importance of autonomy along with the advice of Davenport may warrant future study.

Davenport also proposes formal rewards from the organization for participation and collaboration as a way to reinforce commitment to the practice. Nonetheless, recommendations for incorporating participation and collaboration are welcome but how likely it would be that teachers have the time to do so under the guise of the current structure is a logical concern. In education, it is in fact utterly commonplace that teachers at all levels K- Higher Ed work alone in their classrooms, the library or research facilities. Given all of the pulls of the structure, there is rarely time for even informal collaboration at the photocopy machine or water cooler. Elementary school teachers are rushing off to yard duty in their off class time while university instructors are often in committee meetings or holding office hours.

Moreover, Davenport (2005) points out that knowledge workers do not like their work to be ignored. Many studies in the past decade have focused on a lack of reward for work well done, including innovations like adding technology to classrooms and an almost inverse effect for university instructors such as not getting tenure for lack of research (Passmore, 2000; O'Meara et al., 2003; Ensminger & Surry, 2002, 2008; Ensmigner et al., 2004; Adamy & Heineke, 2005; Conceicão, 2006).

Some voids then that led to the refining of a final research question were: Are there schools that have created conditions favorable to technology integration? Have teachers continued to participate or did they drop off due to time constraints? If not, what did the organization do to allow time for such work? If a school reports being particularly innovative and successful in its integration of computer technology, what

were the organizational conditions that led to that? How were they incorporated and upheld? Did the educators feel as if they were being treated as knowledge workers? These important questions are noted for inclusion in the overall topic for this dissertation study and will be repeated in a subsequent section.

Another question considered was: If technology was successfully integrated into a school, were there rewards for the instructors and what were they? Did the rewards coincide with time release or were they in addition to? Were there beneficial arrangements over intellectual property ownership? How did the institution create these favorable conditions?

Is technology integration is simply difficult if not impossible when it is imposed on a knowledge worker who does not have the opportunity to work as such given the organizational and physical structure of a school? Is there something specific to knowledge work in a school setting that makes technology integration implausible?

What is known to date is that in spite of research drawn on more than 12 years of studies, the literature is not offering a convincing explanation as to why technology integration in education is so far behind the other environments in which it is used such as business. Studies tend to point the finger of blame almost exclusively at the instructor. In spite of the indications in the literature that there have been great strides to redefine how instructors are trained, mentored and encouraged to collaborate (Maguire, 2005; Piotrowski & Vodanovich, 2000; Pajo & Wallace, 2001), there is little evidence today of any serious positive outcomes.

Hence from here, one can glean that enough information is absent from the current literature to be satisfied. Considering the fact that many studies over the past two

decades have pointed the finger of blame to the teacher yet, in spite of these studies, nothing has evolved in the way of enhancing integration into the work of teachers, it seems more feasible to look at the organization itself, which has been greatly understudied. Given what is known about the industrial nature of modern day schools via Hargreaves (1994), about change based primarily on the works of Fullan (2001), about knowledge workers based on Cortada (1998) and Davenport (2005), knowledge work and technology based on Zuboff (1998) and lastly regarding the studies of schools and the new work of teachers in Flores (2006), Cuban (2001), Palfrey & Glasser (2008), Bauer & Kenton (2005), and Kennedy (2005, 2010), it seems appropriate to study the organizational conditions of a school that has had a success integrating technology into the work of teachers.

Chapter Three

Research Design

This study sought to understand which organizational conditions are factors in the successful integration of technology into the work of schools. The research question at hand is an interesting one. Much has been written on the topic of *organizational conditions* and separately on *technology integration* yet there is a scarcity of studies on the combination of the two. It seems to an outsider that some plausible explanation should be relatively straightforward though, given the copious research on the topic of integration, nothing is feasible in the way of explaining the phenomena. Quite a bit is known about *change* and organizations themselves though not enough is known about their relationship to the successful integration of technology. Therefore, it had been hoped that going into an institution, observing, and posing questions related to factors that may seem routine and mundane to even those on the inside, would have shed some light on the topic. As Stake (1995) points out, a qualitative study capitalizes on ordinary ways of making sense of experiences and observations. What events am I watching? What do I see all around me? What are people doing around me? How do they interact with each other? When I am one-on-one with them and I toss out general questions, what is it that people are dialoguing most about?

Qualitative research, according to Denzin & Lincoln (2000), is a situated activity that puts me as the observer-researcher in that world. I will look at things in their context, in their natural setting. If I am studying an educational institution such as an elementary school, I must go into that school to observe it, not do so from a lab or via surveys. A more qualitative approach is appropriate with regard to technology integration in schools

because I am looking for interrelationships and not necessarily cause and effect. As a researcher, my aim is to gather thick descriptions of events and relationships within the context of the school. The goal then, is to look at the issues, often complex, situated, problematic relationships, and to generate a picture of the case thus producing a portrait for readers to see as a whole (Stake, 2006). These interrelationships that will hopefully generate this big picture should begin to surface along the way as I move towards exposing some convergence of what Erlandson et al. calls *multiple realities* (Erlandson, Harris, Skipper & Allen, 1993). One must bear in mind that Qualitative approaches do not attempt to resolve situations they rather strive to create a mosaic of information or central meanings about the interrelationships in the institution, here a school.

Rather than contributing to a body of work that is generalizations, the goal according to Erlandson et al. is to develop shared constructions that illuminate a particular context and offer some working hypothesis to other researchers. This mosaic then of descriptive information would hope to be useful for discovery learning from the case study (Stake, in Denzin & Lincoln, 2000). The intention then of this type of study is not to "find the correct answer" to a specific question; it is to contribute to future research projects and/or to the literature on best practices, and action like a shift in practice.

Lincoln and Guba (1985) have a preference for case study in naturalistic inquiries. A case study offers a close look at one event even if the situation may be much more complex and may possibly shift during the investigation. It would not be unusual and rather, should be expected, that there will be shifts as the research moves along. There should be some idea of a design yet it should be as unstructured as possible to leave room for change. For example, if an interview question proves to not be useful with the first 10

subjects, it can be eliminated. New ideas may emerge though that may trigger a new question or two to be used with other subjects. I may need to go back and pose my new questions to those I've previously spoken with. This new question may also lead me to go back and do more observation on a certain matter. In this type of inquiry, I need to be structured enough to be organized yet loose enough to allow the case to guide itself in its design. This tentative design then will be modified over and over again and must be in place as a valuable guide for the researcher (Erlandson et. al, 1993).

Sources of Evidence

According to Yin (2009) a holistic description is sought in a case study in order to formulate more accurate theories. The investigator is obligated to do more than just survey, s/he must also observe and gain access to the inside. This is done through observation, surveying and interviewing. Albeit, in addition to dialoguing, asking questions and observing, the researcher must too follow certain procedures and general rules that are expected in order to be credible and reliable.

Both Yin and Stake identify approximately 6 sources of evidence in case studies: documents, archival records, interviews, direct observation, participant observation and physical artifacts. The compendium of activities then offers a more holistic view of the issue, a major advantage to case study according to Yin.

Documents and Archival Records

Documents in education would include any administrative papers such as departmental rules and regulations, general school rules and/or guidelines, meeting agendas, and course syllabi. In the case of discussing tenure, rewards or pay, the guidelines for tenure, timelines and salary schedules would be considered documents.

Archival records would be lists of names such as current and former faculty, tech support people and principals, current and former students, and perhaps even past surveys done by another party.

Interviews

Interviews are of great importance to case study. Yin identifies 3 types of interviews: *in-depth interviews* that may take place in one sitting or over multiple meetings. Yin prefers the role of the interviewee to be more of an "informant" than a "respondent" thus the interviewer should suggest topics for conversation rather than simply asking questions. Stake also warns that open-ended interviews are integral to case studies. The second type is the *focused interview* in which an interviewee is present for a short period of time and the interviewer follows a more rigid set of questions. Yin prefers this type be used to corroborate certain facts, for example. The third type of interview he suggests is *survey* and should be done in relation to other sources of evidence but not alone.

Direct Observation and/or Participant Observation

Direct observation is another key component to case study and locates the event or phenomena studied in its natural environment where conditions and behavior can be observed. Yin lists observations including formal activities like meetings or more informal data collection such as noting the condition or arrangements of workspaces. Another type of observation is participant observation in which the researcher is not passively watching rather interacting. This can be problematic for various reasons such as limited access to subjects or biases it may create.

Physical Artifacts

Lastly, another source of evidence is physical artifacts such as instruments of work or tools. Yin gives the example of a computer printout to determine an exact usage of student machines. A physical record such as this will be most helpful when substantiating data. Stake also reminds researchers to try hard to recreate the conditions observed for the reader in an effort to establish vicarious experiences. Physical artifacts then in combination with descriptive observances will be powerful tools.

Yin suggests that these 6 types of evidence can be best utilized to their full advantage if the researcher follows 3 principles. First, use multiple sources of evidence. Neither Yin nor Stake believes that any one source of evidence is appropriate. In an effort to best achieve corroboration of data, triangulation is the process by which the researcher confirms accuracy of information observed, surveyed, verbally conveyed and gleaned from the available sources. Triangulation uses these multiple sorts of data and is an important strategy in case studies for both Yin and Stake. In fact, according to Yin, it is a necessity. In the process of data collection the ability to interview live subjects about a contemporary phenomena is superior to experiments limited to labs or simply using survey techniques with written comments. Using these multiple sources allows for development of *converging lines of inquiry*, producing more accurate and convincing conclusions (Yin, 2009).

Secondly, Yin suggests creation of a database to organize what has been collected. There are different types of databases such as those that are tabular, narratives or documents. It should be determined individually how to best carry out this task. This

can be a very useful in the case of multiple researchers who are entering data from different sites at various times, for example after each interview occurs.

As a third principle Yin recommends maintaining a chain of evidence to increase the reliability factor. Thus an external observer can best follow the chain of thought involved via retracing the steps taken by the researcher.

Documenting the ordinary is time consuming and as a researcher I needed to be prepared for the great deal of descriptive work (Stake, in Denzin & Lincoln, 2000). Because naturalistic inquiry and case study rely on thick descriptions, the researcher needs physical tools on hand such as notebooks for note taking, a laptop or another portable device, and some type of recording instrument like an audio recorder. I was prepared to describe the setting as if a photograph. I had the task of bringing the reader as close to the subject as possible by creating heavy description about sights, sounds, scenery and even relationships as I was experiencing them during my time at the site and during interviews. Erlandson et al. (1993) suggest that one can never take too many notes and that more is better than less.

Thus, a case study was chosen due to the nature of the question, one that seeks the "how" or the "why" of a contemporary phenomena (Yin, 2009). Although there is an abundance of literature on integration problems, complexities and failures, there still exists little on successes. Stake (2006) postures that a case study begs "What can be learned here that a reader needs to know?" This particular research question concerning organizational conditions and successful technology integration lends itself to a *single case study*. Yin justifies his rationale for a single case study when one looks at an extreme or a unique case, an "outlier" of sorts. It is possible that there will be some sort

of replication of the case but for the moment it seems unlikely that it would be found during the course of this study. When no other cases exist to replicate, a single case study then is called for. Even though there are other rationales, this one seems most suitable for the issue at hand. With all of the reported failures, why is this one case above all a success? What makes this one situation unique? Stake recommends that we maximize all we can learn by selecting the best possible case. Thus, if wanting to learn what organizational conditions foster the successful integration of technology, we should then choose the best possible case, the one with the most evidence of success. As a researcher I need to go in to the setting and see the players in their natural setting where their everyday experiences take place (Stake, in Dezin & Lincoln, 2000).

Research Participants/Selection of subject(s)

Search for a school

In naturalistic inquiry, the selection of a site is a critical decision (Erlandson et al., 1993). Several factors were considered when selecting a school for the case study. Nonetheless, it became a difficult task to identify a school that had a reported success and a long term one at that. This was not a surprise but the challenge to find a school was much greater than had been anticipated, a testament to the true uniqueness of this case as documented in this section of the dissertation. This is not to say that many innovative teachers are not doing small interesting projects all over the U.S.A. and internationally. Yet, when one looks for a success story of a school that has seemingly integrated technology into the educational landscape of the entire school plus has sustained the innovations over time, it was not easily found.

The school was to have been chosen by a combination of purposive sampling (Erlandson, Harris, Skipper, & Allen, 1993) and reputational case selection. Primarily it was to be selected for its reputation as a school that has integrated technology. As previously outlined, the school must meet the criteria established at the onset of the study with regard to *successful integration*. These were determined to be:
(a) when technology that was integrated spawned a change in teaching practice, in other words, moving from traditional teaching to teaching that involves the use of technology for *teaching and learning*; (b) when the technology has been used at least 3 years;
(c) when technology is approximately 20% of the classroom work of teachers, (d) when students perceive that the work of the instructor relies in part on technology and it enhances teaching and their learning; and (e) when parents or tech support staff feels the instructor relies in part on technology and it enhances teaching and learning.

Secondly, the school should have been convenient in access for the researcher (Stake, 1995; Erlandson et al., 1993). Obviously one that was located in some proximity to me would have been preferred. The hope was to find a school in the Silicon Valley area, San Francisco Bay or elsewhere in Northern California. It seemed very likely that a Silicon Valley or Bay Area school could have been found with relative ease given the proximity to major software and hardware producers plus universities like Stanford and Cal Berkeley both with Schools of Education that have many links to the K-12 schools in the community. Locally, there are also many exclusive private schools of all levels. This would have likely assured a continual, dedicated period for close observation as well as interviews. In addition to physical access, I also considered social access. Was there a clear way to get to the inside, perhaps through some connection such as a former

colleague, an old professor, an alumni network or perhaps a school that I previously attended or was associated with?

The search for a school of any level from elementary to college reporting a success started informally approximately one year before the study began with networking in the two large, U.S. metropolitan areas of Chicago and San Francisco. The networking primarily took place with professors and teachers associated with Northwestern University and Stanford University in four disciplines: Foreign Languages, Education, Information Technology and the Graduate Business School. Both Schools of Education were helpful but unsuccessful in their ability to identify local K-12 schools. The search was quickly likened by some as looking for the proverbial needle in a haystack. When following up on self-reported successes, I immediately noted that there was no established standard of what *technology integration* really is. Many school districts, administrators, teachers, students and parents (although not all actors within the same school felt the same way) often sensed that there was *technology integration* when any of the following was in place: (a) teachers using computers for recording or reporting grades, communicating with parents, presenting Power Point documents in class or doing web searches; (b) teachers allowing students use of classroom computers to do web searches; (c) teachers scheduling lab time for student use of computers to do an assignment such as an essay in Word or to do a directed web search; (d) students doing a self-directed web search in computer labs or on classroom computers; (e) students having lap tops in the classroom (either from shared mobile carts or a 1:1 laptop) and doing self-directed web searches or typing in essays or doing a Power Point instead of using paper and pencil.

I regrouped and deferred to the previously mentioned opinions of Eteokleous & Laouris (2005), Zhong & Sheng (2002), and Cuban (2001) regarding what the work of teachers using technology should be – in other words, that they should be moving toward a more student-centered type of learning. Technology should fundamentally alter the way teachers teach and the way students learn. I had to remind myself that one of the four requirements I had at the onset of the study was to find a school that was doing exactly this and had maintained it at least 3 years.

An article on http://www.edutopia.org/ by Prensky (2006), http://www.edutopia.org/adopt-and-adapt, states the way schools typically integrate technology. He describes a four step process: first, dabbling, then doing old things in old ways, next doing old things in new ways, and finally doing new things in new ways. Although he states clearly that most schools are still "dabbling," I was searching for schools "doing new things new ways" with computers. Prensky makes a good argument for 1:1 lap top computing. He believes that "the missing technological element is true one-to-one computing, in which each student has a device he or she can work on, keep, customize, and take home. For true technological advance to occur, in his opinion, the computers must be personal to each learner." The obvious benefit of starting with a school that actually has technology in place such as a 1:1 laptop program or a large grant for the purchase of equipment then was thought to have been very helpful in furthering the search.

I first investigated and contacted a high school in Northern California due to its convenient location and given the implications of its name (here the pseudonym of

"Hi Tech High" will be used), the likelihood of doing something different with technology. The school was funded by a private nonprofit at its inception and is related to other schools with sites in the U.S.A. including two in Northern California. Although neither the school principal nor the directors of non-profit organization replied immediately to requests for information, I conducted a very informal 45-minute interview with a sophomore at the school. The student felt that there was a great deal of technology at her fingertips but other than geometry and media communications, she did not give the sense (under my working definition) that technology was integrated into the curriculum. She did feel that teachers were very open to allowing students to do their assigned pre-conceived tasks by computer such as Power Point or using Photoshop to present projects at the end of a term. Shortly after this, the then Executive Director of the foundation did make contact with me. In a face-to-face meeting during a visit to the foundation, the E.D.'s opinion was that the current principal had not allocated money properly and that the technology was very out of date and not sustainable. Without sufficient evidence of a success to study the school under my self-imposed requirements, I determined I should look further.

While waiting to hear back from this school, I decided to follow the blog of a prominent San Francisco Bay-area professor of Education Dr. Larry Cuban, http://larrycuban.wordpress.com/tag/technology/. He is considered by many to be a "Luddite" or a "contrarian" in opposition to technology in schools due to his stance that too much money is spent on computers and they are underused (Cuban, 2001). Nonetheless, he does not consider himself in this light. He has written a great deal on Silicon Valley and Bay area schools with regard to school reform and technology. None

of the information on his blog nor personal emails revealed any area schools that can report a successful technology integration for a period of 3 years. In fact, Cuban said he was just completing his own study of a 1:1 laptop program but felt thus far he had little to report. (In the time since the search began one year ago, he has posted preliminary results of his 1:1 laptop studies on his aforementioned blog. He has not changed his stance on the use of technology in these high access schools.)

The search was then formalized several months before the study was set in place. I met via Skype with my adviser several times to formulate ideas on the search. He encouraged me to continue to contact those I had not heard back from as well as to seek out new contacts. I emailed the Center for Children and Technology (CCT) in New York, N.Y. CCT is a group of educational researchers whose intention is to research children's teaching and learning via technology. It is funded by Education Development Center, a non-profit. Their website http://cct.edc.org/ hosts hundreds of studies they have done in-house and it was a very useful tool in this search. I then emailed members of the research group asking if anything was known about schools in the greater Bay area. Some of the researchers were familiar with the area schools through their own graduate experiences but no one school could be identified as having a "success" and no further connections could be made. Then, going to their website, after searching the key words "technology," "integration" and "schools," I found a paper titled "Project Hiller." This was a lengthy paper covering a 1:1 laptop project in an urban failing school in New York, N.Y. The school, Union Hill, had received a rather substantial grant and was able to offer a laptop to each student. The paper did report on the initial successes of the program. Contact was then made with the lead investigator of the study in an effort to find out more about this

school. Unfortunately, it was reported by Dr. Daniel Light that like many other schools that have tried it, the laptop program fell apart before 3 years had passed. Additionally, he was one of several who alluded to the search as "a needle in a haystack." He reported that many schools he knew of who had managed to get 1:1 laptops had not been able to maintain the programs for an extended period of time. Dr. Light did offer a list of 10 schools in the U.S.A. that he felt might have been integrating technology into their curriculum but he was unsure. These schools were located in Pennsylvania, Colorado, Massachusetts, Arizona and California ("Hi Tech High" and its related schools) yet none turned out to be a solid lead in the search.

Coupled with this new information, and the advice of the aforementioned Dr. Larry Cuban and my adviser Dr. E. Flores, I chose to begin a wider web search of schools to see which had technology coordinators. I emailed and called the tech coordinators of two large Silicon Valley school districts. The results were not positive. The search was then widened simply doing a Google search of local schools. One tech coordinator at an exclusive private high school in Marin County did reply with a very thoughtful answer. The school has a 1:1 lap top program. The coordinator was quite in-tune with the basis for the study yet it was revealed that even with a technology-rich environment and somewhat wealthy parents supplying the laptops for their students, she felt the teachers were still not integrating technology into the curriculum.

Another researcher in the local area was contacted as well. Dr. William Penuel has done research on technology in schools for SRI, located near Stanford University. Dr. Penuel echoed the sentiments of the previous contacts by saying that there was very little integration if any going on. He suggested contacting the local high school ("Hi Tech

High") first mentioned and run by a foundation headquartered nearby. He has also shifted his own focus away from California schools and to those in Colorado where he felt there was more of a chance for real integration. Thus two researchers were pointing to schools out of the state but none in particular. And, no one was able to justify the success of any 1:1 laptop program, whether in or out of California.

On the advice of my adviser, I then contacted the George Lucas Educational Foundation (GLEF) that sponsored the creation of the educational community web site known as Edutopia, http://www.edutopia.org/. This organization was chosen first due to its proximity to me (San Rafael, California) and secondly, because the group is predominantly focused on public school improvement and as they state, "what *works* in education." One of its main causes is technology integration into public schools. The web site hosts videos about technology integration and also offers the educational community a technology integration group forum as well as blogs about technology integration such as the previously mentioned article by Prensky (2006). I asked for help in identifying a local school that could be used in the study. There was very little return communication in this process. Three follow-up correspondences were unanswered. But when reviewing their website, one can quickly find information about a few seemingly successful schools like Mary Scroggs Elementary School (http://www.edutopia.org/fantastic-super-use-technology). An 8-minute video discusses Mary Scroggs use of technology in 2002: http://www.edutopia.org/technology-integration-digital-divide-scroggs-video.

Two schools located in the South of the U.S.A. in particular are highlighted in videos on Edutopia.com, one an elementary school and the other a high school. Both received Bell South educational grants in late 1990's and the early years of 2000 and both

report success with integrating technology into classes and the curriculum. Because no California successes had been found, I contacted both of these schools to see if the successes had been maintained over the years. There was a great deal of contact with the elementary school and little with the high school. Additionally, Dr. Larry Cuban offered me the advice to try to study an elementary school if I had the choice because there are fewer social issues to weed through.

The Mary Scroggs Elementary School in North Carolina has in fact continued to be a reported success for more than ten years. A media page on their home site http://www2.chccs.k12.nc.us/education/components/board/default.php?sectionid=10 as well as a much other information available to the public, echoing what can be seen at http://www.edutopia.org/fantastic-super-use-technology and http://www.edutopia.org/technology-integration-digital-divide-scroggs-video , did seem to reflect the same successes as reported in quite a few email communications with the principal. There was then extended follow-up with the principal and later, many emails and a phone call with the technical coordinator. The principal and tech coordinator were very forth coming with information and independent reports have been corroborated. These reports include the extensive use of technology in many ways in all grades. Here by "technology" Mary Scroggs' use in PK-5th grade includes (but is not limited to): lap tops, fixed computer stations, mobile carts with various capacities, SMART Boards in every classroom, Internet in every classroom, portable iTouches for use inside and outside the classrooms, live television-like streaming broadcasts of daily "news" (beginning of the day announcements) created by students for students, and extensive use of a VoiceThread.com license. Please refer to Appendix A for more detail.

Upon finding the Mary Scroggs School, my adviser then determined that permission to go into the school and study the organizational conditions would be appropriate. Given the great distance involved, the adviser suggested a study of online interviewing techniques especially those used in combination with a local visit to the school.

Setting

The Mary Scroggs School is one of 10 elementary schools in the Chapel Hill-Carrboro City Schools school district (CHCCS) in the state of North Carolina in the U.S.A. It is a public school and it also has a significant ESL (English as a Second Language) population, approximately 23%. This is mostly owed to the large Spanish-speaking presence along with many children who speak Korean but is in part due to the children of foreign-born employees at the nearby public university, the University of North Carolina Chapel Hill. Mary Scroggs School serves grades PK-5 and has an enrollment of approximately 679 students at the time of the study as reported by the school board. The students are split 50-50 with regard to gender. The ethnic composition is approximately: 60% white, 10% African-American, 15% Hispanic and 15% Asian. It is reported that 21% of the students qualify to receive financial assistance via a free lunch program.

The North Carolina School board reports the following: There are 56 teachers at Mary Scroggs making the student to teacher ratio about 1:13 however each classroom typically has 22 students. The other faculty members are aides, paraprofessionals, and other non-classroom teachers like librarians and the tech coordinator. 39% of the teachers have advanced degrees higher than a B.A. Teacher turnover was reported to be 11% in

2007. Twenty-three percent of the teachers have 0-3 years of experience, 32% 4-10 years and 45% 10 or more years. Mary Scroggs has had a principal (retired June 2010) who also served as the former Assistant Principal for many years. Thus there had been only two full-time principals from 1999-2010. The school shares a technology coordinator with another local school, Ephesus Elementary, also in the CHCCS district. The technology coordinator (henceforth referred to as TC) is on-site at Mary Scroggs only half time. There is also one full time tech assistant (TA) and two support staff in the library who are available for tech help if needed.

One hundred percent of all classrooms are connected to the Internet although not yet via wireless. The state average in North Carolina is 99 percent of classrooms connected to the Internet. The TC reports that there is not a 1:1 laptop ratio. She reports that as of 2010 it is more like 1:3 because there is one iTouch for each student desk in certain grades (for example, fourth and fifth). The iTouch remains on the student desk throughout the day and also leaves the classroom with students during their "walking time." Yet, as for actual computers or laptops for student use, the number is approximately 130 and iTouches approximately 90. Each teacher has a laptop, which connects to the school system even when out of the building. Each classroom has a SMART Board as does the gymnasium and Preschool.

More specific data about technology types, use and allocation is available on the school's public website and at the end of this document in Appendix A. Here follows a portion of that information from the school website: The focus is on resources in two areas, Communication and Learning Resources. All certified staff members have a web page with curriculum information and classroom events. All classroom teachers have a

listserv for their class and the principal has a school wide listserv. These are used to send weekly updates, reminders and time sensitive information to families. As for Learning Resources, technology is a tool, used to support and enrich the curriculum. Students use applications such as iMovie and GarageBand to produce videos and Podcasts, and VoiceThread for digital storytelling. Productivity tools like Microsoft Excel and Microsoft Publisher are used. These applications allow for differentiation and promote high quality student work.

According to the TC's correspondence with me, all regular education classrooms have four networked computers. The workstations are a mix of Apple and HP Thin Client. All certified staff has an Apple laptop, all classrooms have interactive SMART Boards and all instructional spaces have data projectors. Four mobile, wireless laptops are available for student classroom use, one computer lab with twelve workstations and one with 20 workstations. Teachers sign up on an email calendar to reserve these resources. They have 3 iTouch mobile labs (carts). There are used by fourth and fifth grade students for content delivery, data collection and implementation of web 2.0 resources. The students also use them to listen to shared reading and writing activities of student creation. All staff and students in grades 2 through 5 have Connect 2 School accounts. This provides access to files and documents anywhere an Internet connection is available and is used primarily for students from home.

Although this study offers no connection between assessment and technology and does not in any way purport to measure it or draw conclusions, it should be stated how Mary Scroggs does compare to other elementary schools in North Carolina with respect to achievement. The use of standardized test scores is a common measure in public

schools as well as private in the U.S.A. Mary Scroggs Elementary ranks 63rd of 1258 North Carolina public elementary schools with regard to test scores. The district itself, Chapel Hill-Carrboro Schools, ranks 3rd of 112 North Carolina school districts. According to available data, this is primarily based on the success of its high schools. There are seven categories of schools as ranked by the State Board of North Carolina:

1. Honor school of excellence: At least 90% of students at grade level and the school made adequate yearly progress
2. School of excellence: At least 90% of students at grade level
3. School of distinction: At least 80% of students at grade level
4. School of progress: At least 60% of students at grade level
5. No recognition: 60 to 100% of students at grade level
6. Priority school: 50 to 60% of students at grade level, OR Less than 50% of students at grade level
7. Low performing school: Less than 50% of students at grade level

The State Board of North Carolina determined in 2007-2008 that the Mary Scroggs was a *School of distinction* with at least 80% of students at grade level.

The Mary Scroggs School operates on a traditional American public school calendar. School is in session from the third week in August to the second week in June. In addition to all expected classroom schedules and holidays, the school website shows school closed for teacher professional development days ("teacher work days") once per month as well as one delayed opening day per month. A School Improvement Team (SIT) made up of parents and school staff meets one evening per month in the school media center.

To learn more about School Governance, one can go to the public website www.chccs.k12.nc.us/scroggs/ The school boasts a "Dual Leadership Model." This is explained as such: The governance model for Mary Scroggs Elementary School is

slightly different than that of other schools in the Chapel Hill - Carrboro City Schools district. The School Leadership Team (SLT) and the Parent Advocacy Committee (PAC) serve as the mechanism for on-site governance for Mary Scroggs Elementary School. This organization allows for effective shared decision-making at the school level.

The Mary Scroggs Elementary School Leadership Team is composed of the principal, assistant principal, house leaders, media coordinator or technology specialist, family specialist / counselor, classified staff representative, and Exceptional Education representative. The chair of the Parent Advocacy Committee (PAC) and specialty area teacher and one other member of the PAC will serve on the Leadership Team. The Mary Scroggs Elementary School Leadership Team serves as a forum for input from teachers, support staff, administrators, parents, students and community members on the operations of the school. The SLT provides structure for effective shared decision-making at the school level.

The website reports that the Parent Advocacy Committee (PAC) serves as a forum for input from parents, students, and community members on the operation of the school. It advises and recommends to the School Leadership Team (SLT), it encourages free and open discussion with respect for divergent points of view, while striving for consensus, it responds in a flexible manner to the ever-changing needs of the community as well as the larger population served, and to change and grow with the school, and lastly, it provides primary leadership and authority in the day-to-day operation of Mary Scroggs Elementary School.

Technology in the Daily Work of the Mary Scroggs School

A Brief Overview

Although the objective of this dissertation is not to explore uses of technology in a school, an overview of the technology picture at the setting is necessary to establish an understanding of the conditions and practices in place. This will give an idea of what is meant when "technology use" at Scroggs is mentioned. After a general portrait is painted, then exploration of findings related to the organizational conditions and administrative practices that may have contributed to this success at the school will be presented in Chapter 4. For an in-depth description of technology use in the daily work of teachers and students at Mary Scroggs, please see Appendix A.

These are only examples of some of the work with technology and in no way is a summary of all the work. Most of the projects outlined here as were done in 2009-2010 schoolyear and the fall of 2010. Some was viewed on line via a search of the archival electronic files of the school. Multiple Skype camera sessions in Spring 2010 through the end of the calendar year 2010 with faculty and administrators also offered a unique look at the school from a distance. A noteworthy observation is that in my Skype interviews with teachers and staff, in each and every case, the teacher/staff member who was in no way prompted or asked to do so, picked up his or her lap top and began to show me around the offices, classroom, Media center, etc. Teachers were also quick to pick up other tools from their desks like iTouches, flip cameras, digital video cameras, digital microscopes and the like. This extends to all teachers not only younger and more digitally hip. Equally, the new principal in 2010 who reports herself as not having been exactly digitally savvy, did the same in her office. The remaining observations were made in person in a one-week in depth site observation in December of 2010 and are found in Appendix A.

During my onsite visit, there was technology being used in every corner of the school in virtually every classroom all day long, although certainly not always to the same extent. Even teachers who do not necessarily favor technology are minimally using interactive SMART Boards, laptops and 4-5 fixed computers in their classrooms with students on a rotating basis. Some of the teachers are younger and their interest and ability with technology can be expected. Yet at Mary Scroggs, there are an almost equal number of younger and more seasoned teachers using technology in creative ways. One of the most interesting cases is the 54-year-old P.E. teacher who is considered by colleagues to be one of the highest integrators.

The activities with technology at this school appear to be very learner-centered. Key boarding ("typing") time is reserved for the fixed computer lab only yet it seems to be rarely practiced. At no time in my one-week site visit did I see any key boarding as an activity. The closest observation was in one case where Fourth Grade students were creating a blog. Instead, the choices were all creative, small projects with portable technologies, many using GarageBand audio, video, digital camera and/or presentation tools like *Wordle, Glogster* and Power Point or the aforementioned blogging. Often times these presentations are shown during the daily online broadcast (formerly live) of the "Ribbit News." Each teacher shows the news (announcements) on his/her SMART Board at the start of the day.

The success of the Mary Scroggs' technology integration and long-term sustainability of its high usage is unusual. To truly understand the big picture, a qualitative case study was called for, one that not only looks at resources and numbers but also takes into account people —students, parents, leaders, staff, teachers, plus their

work, their attitudes and the organizational conditions and administrative practices that operate simultaneously in the institution.

Factors Observed and Explored

Mary Scroggs is a very noteworthy case study. It is a school that I feel is remarkable. This is not a privileged private school by any means yet it is a success story with regard to technology use. It is a well-funded public school yet with an ethnic and language mix. Again, the ethnic composition is approximately: 60% white, 10% African-American, 15% Hispanic and 15% Asian. It is reported that 21% of the students qualify for the free and reduced lunch program. So what is it that makes it an *extraordinary* success case with regard to technology integration? After all, it does not boast a 1:1 laptop program. Rather, the Tech Coordinator tends to prefer more creative, mobile and inexpensive technologies like iTouches used along with fixed computer stations and some mobile lap carts. All teachers are also requested to use their SMART Board (one per classroom including gymnasium and music). As I looked through the archival documents for my research, in particular the minutes from the SIT (School Improvement Team) from 2009 to 2010 it was interesting to note that aside from a concern for student privacy from one parent, the one thing that is not mentioned is technology. I believe this contributes to the idea that at Mary Scroggs, technology is not "new" or an "improvement" it is simply put another tool in the teachers' classrooms.

Amongst other issues, it will be interesting to explore the decision-making involved in these smaller purchases vs. 1:1 laptops that appear to be more the trend. Was the decision rooted in ideas from the teachers, the Tech staff or the administration? Was it district-wide?

Questions/Topics for Discussion

As a researcher, there are many questions/topics to pose to Mary Scroggs and the Chapel Hill School District's administrators, staff, faculty, students and parents concerning organizational conditions and administrative practices. For a look at my understanding of the interplay between organizational settings and administrative practices, please see Figure 1. My understanding of *organizational conditions* is "school management, practices, and systems" (Pedder, 2006). Many schools have the same or similar organizational conditions. Yet, those that I feel may have something to do with a successful technology integration will be the first I focus upon. I consider those, in brief, to be: resources (especially money and technology support), rewards, time allotment, work arrangements and on-the-job learning.

Secondly, I would define *administrative practices* as the practices that are derived from the conditions or settings. Administrative practices can vary from one institution to the next and sometimes change when there is a change in leadership or a change in need in the institution. These practices are then not as fixed as the organizational settings and can shift over time. For example, some leaders may adjust the practices to offer more say to a different group or groups. One aspect in particular that is useful to determine the decision-making process in the school district or Mary Scroggs School with regard to each setting. I also looked for communication and evaluation/follow-up. I relied on some of the decision-making/leadership ideas from Anderson & Dexter (2005) who identify these practices with regard to integration as *technology leadership*.

Amongst the topics I addressed were those listed as follows. Although my list shows mostly "questions", these were posed more as topics and when needed, were later

reformed as questions. In each case, I remained open to the responses eliciting further questions and discussion.

Resources (e.g. Money and Tech Support)

(a) Who made the somewhat unusual decision to purchase iTouches and a VoiceThread license along with Smart Boards rather than to purchase more laptops or fixed computer stations?

(b) Was that decision made alone or in tandem with another person or group?

(c) Who was the greatest advocate of that decision? Does this person/do these people actively use technology for work purposes? Did this appear to have any influence?

(d) In general, how do these decisions get made? From where do the ideas stem?

(e) What is the typical decision-making route at Mary Scroggs? Who has the final say? Was this decision path "ordinary" for Mary Scroggs?

(f) What is the yearly tech budget for Mary Scroggs and how is it distributed? Can you compare this to any information you may have from other schools you know of? In other words, is it ordinary and comparable?

Rewards

(a) How are the salaries and benefits determined? Are they merit-based or determined on longevity? What is the general feeling about salary in the school?

(b) Is there a possibility of tenure and if so, how is it achieved? Who is/are the decision maker/s?

(c) Is there sabbatical time allowed and how is it achieved? Who is/are the decision maker/s?

(d) Are there awards or recognition for faculty and staff? Is the process self-nomination or if not, who does the nominating? What is the required process? Is this promoted in the school or the district? By whom?

Time

(a) What is a typical in class schedule like for faculty and staff at Mary Scroggs? What about scheduled meetings?

(b) Explain work hours and prep time, plus time for additional components like dabbling with technology.

(c) What are your time commitments outside of the classroom (meetings, clubs, travel to conferences, mandatory professional development and the like?)

(d) Is there any scheduled opportunity for downtime such as time for reflection, relaxation, exercise or the like?

(e) What additional time do you spend out of school on work related issues? What is the typical amount of time spent out of the scheduled workweek for school responsibilities?

(f) How is time spent over the non-school weeks of the summer (typically 8-9 in the U.S.A.)?

Work Arrangements

(a) What are faculty and staff work arrangements? Is there ever flextime, shared positions or the ability to work from home? ("Flextime" is usually defined as the ability to arrive early or leave later depending on family commitments. "Shared positions" are generally when 2 part-time employees, often women with children, share the responsibilities of 1 fulltime worker.)

(b) Explain the physical arrangement of your workspaces (classroom, office, staff-only areas).

(c) What tools do you have (telephone, computer, printer, copier, scanner, etc.)? Which do you lack? Are they yours or shared? By how many?

(d) Does your physical workspace promote isolation? ...work in collaboration? ...unwanted interruptions? ...ease or difficulty in accomplishing tasks?

On-the-job Learning

(a) Explain professional development opportunities in particular with regard to technology.

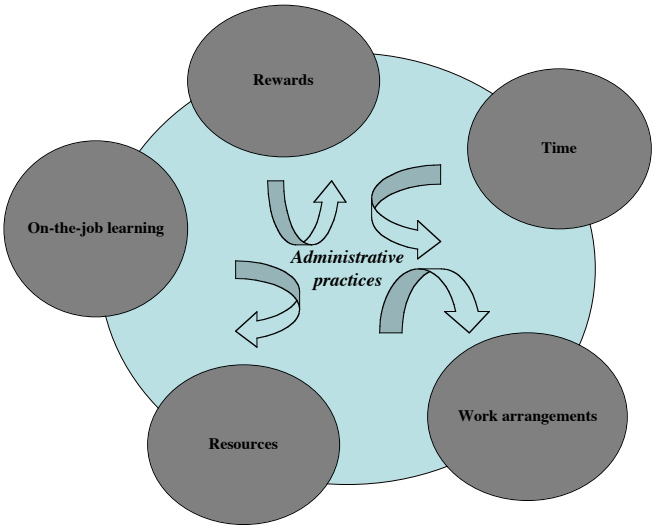
(b) Please explain any intrinsic or extrinsic rewards as compensation for this learning.

Procedure/Data Gathering Techniques

Prior to beginning, permission in writing was secured from the school district superintendent. Upon approval of the IRB packet, I secured permission from the principal to begin to interview subjects via Skype. It was up to the superintendent if the name of the school was to be used in the final report. Once inside the school, I began to gather information regarding the organizational conditions and administrative practices to be studied, including but not necessarily limited to rewards (tenure, recognition, sabbatical), time allotment (including release time), work arrangements, money, technological resources and support staff, and on-the-job learning. See Figure 1.

Figure 1

Data to be Gathered Will Focus on Organizational Settings/Conditions and the Administrative Practices that are Derived From Them



Other factors were kept in mind as data was collected. Data collection and analysis is a continual process in qualitative research and certainly was no exception here. To conduct the study several data collection procedures will be utilized. Those were personal interviews, observations, archival document analysis and whatever surfaced as needed to get the data desired. In the subsequent sections I described the 6 planned phases of my data collection.

Preparation for Introductions, Phase 1

Statement of Intentions, Permissions

I prepared a statement. In accordance with Salmons (2010) and O'Connor et al., (2008) some written thoughts intend to explain the approach of the researcher with regard to the research question the reasons for conducting the study and the goals including that

their participation will form part of a doctoral thesis. There was assurance of ethical conduct and privacy and how the data will be archived and stored. It discussed reasons as to why the interviewees had been asked to participate and how their participation would benefit the institution as well as other schools. It was explained that their school is a success story and we hoped to understand some of the factors that set it apart from other schools. Included was information regarding the time frame of the study and the commitment needed by each participant along with the technology required. Salmons favors a singular statement like this so all potential participants begin from the same common view of the study.

At the time the statement was provided, I sent a written permission form along with a self-addressed stamped envelope. This permission asked the subject to agree to recordings of the interviews after the initial introduction was made. I specified how the information would be handled (e.g. confidentially if preferred), who would have access to it, and how it would be stored and later destroyed.

Determination of Sample Size

In determining the sample size, given purposive sampling was being employed, the number of people was less important than the criteria used in selecting them (Wilmot 2008, cited in Salmons 2010). I began by interviewing the current principal, newly appointed July 2010, and assistant principals from the past 10 years, the tech coordinator(s) for the past 9 years and faculty actively using technology in their classrooms, one from each grade level K-4 including dual immersion with Spanish. (Fifth grade teachers declined to participate citing lack of time.) Lastly, I felt it would be interesting to interview one or two teachers who *do not* actively use technology or at the

very least, hear their stories through a supervisor and colleagues. Then, I was open to interviewing more participants when emerging factors surfaced or if the informants I had already met with offered names of new people I could interview. This was most definitely the case as each and every person was eager to applaud a colleague and gave me a new name.

Preliminary Contact with Administrators

Due to the great distance between the investigator and the school to be studied (2,500 miles), some preliminary introductions had been made via email to the recent former principal just retiring and the Tech Coordinator. Both participated in somewhat lengthy email queries about the school and its reported successes. Introduction to the new principal, and the previous principal, faculty and staff members were made by Skype with web camera.

Researcher's Daily Log/ Human Instrument

As suggested by Erlandson et al. (1993) and Dr. Manuel Flores Fahara in my previous coursework, I had begun to keep a daily log of my activities and my reflections with regard to my research. This not only provided me an opportunity to record my growth as a researcher but it also allowed me two other important opportunities. First, I recorded any prejudices or issues that surfaced during my work. Secondly, and as was found to be of utmost utility in the process, I recorded any questions that arose for my adviser.

Online Introductions, Phase 2

In naturalistic inquiry, trust is a key component. It was essential to gain a rapport with the subjects first, perhaps not using any note taking or recording devices at first and

subsequently progressing towards that (Erlandson et al., 1993). Thus in this Phase 2, I was not be recording but I had a pen and paper handy in case anything interesting was mentioned. I was asking general questions and getting to know the subjects and letting them know more about me as a professional and my research. James & Busher (2009) also recommend this sort of informal chat prior to more formal interviews online. The "trajectory of acquaintance development" aids in the process with online interviewing.

With regard to online Skype interviews, Salmons (2010) prefers this sort of real time synchronic communications over more asynchronic methods in online interviewing. But, both Salmons and James & Busher (2009) feel that there may be some advantage to using email as to produce a thoughtful response. O'Connor, Madge, Shaw, & Wellens (2008) though do not agree. They suggest that a thoughtful response may produce a more socially desirable answer rather than a more spontaneous one. Thus I chose to employ online interviews prior to my arrival on the site. If for any reason it had surfaced that a subject may have been more comfortable working in writing, then I worked via email. This was true for only the first contact with one of the 16 subjects I followed. She did meet with me in person for the second interview.

Since some online research reportedly lacks visuality (O'Connor et al., 2008), the next step was be to set up the online web camera-based interviewing appointments in advance and at the convenience of the main participants I had not yet been introduced to. First, I determined most of the responders by suggestion of the new principal, the Tech Coordinator, the former principal and my adviser. Then, as Lincoln & Guba (cited in Erlandson et al., 1993) suggest more respondents were selected "serially" based on

previous respondents' interviews on Skype. This type of purposive and reputational sampling was imperative as I chose subjects.

I met online under the described online conditions with the new principal, the Tech Coordinator and the former principal for a re-introduction since I had not had contact with them previously via telephone, email or Skype. I relied on them for help in determining whom else to schedule interviews with. Once a list of names was provided, I began to introduce myself via Skype with as many of the participants as possible. I had an initial target of 10 people and ended up interviewing and observing the work of sixteen.

As a noteworthy procedural issue for any other online researchers to consider, I did find Skype to be so personable and so "up close" that all of my interviewees immediately connected with me and began to give me copious information right from the start. In discussing this with my adviser he reminded me that this was not to be done in the initial interviews. Thus, as a learning outcome to this rather new idea of virtual research, I suggest in the future, I would specify the initial meeting time as being a 20-minute introduction and the importance of planning a second meeting to get to the real topics of interest. I felt as if I had to stifle the flow of information from my informants. In part I do surmise this to have been an effect of studying a success story.

I mentioned at the end of the introductory interview that I wanted to record the subsequent chats. I then went ahead and purchased a tool to record the Skype calls with a dual screen. The tool can be found at **http://ecamm.com/**. Sharing these large file interviews with my adviser then was done with a free tool like **www.dropbox.com**.

Online Interviews, Phase 3

This phase was akin to what Yin (2009) identifies as in-depth interviews that may take place in one sitting or over multiple meetings. Once a rapport has been established with the major players, I began to employ my pre-conceived questions while at the same time, remaining very open to dialoguing about any other topics the subject brought up. The interviews were now being recorded (if the participant agreed) and notes were taken. I had a planned topic (e.g. my pre-established questions) but was not structured in a sense as to not allow for storytelling on the part of the subject.

The interviews were quite unstructured yet it was obvious that certain information is sought. Open-ended questions were to solicit stories, thoughts and feelings (Salmons, 2010). Yin and Stake (1995) both recommend questions be very open-ended and not "asked" rather "posed." Qualitative research is based on active participation from the interviewees and careful listening by the investigator. I needed to pose some of the broader topics I have in mind. If I did not get what I awas looking for, I needed to toss out a few more directed items while remaining as open as possible. These directed cues are what Erlandson et al. (1993) call *probes*. I found in two circumstances it was difficult to get good answers without probes. Both occurred in the third interview I had with two of my subjects. One, who so kindly agreed to speak with me at the very end of her day from home prior to what must have been her bed time was clearly exhausted from her long day at work. She was understandably much less conversational than our other meetings but did not let me down. Next, there was the case of a follow up interview in a shared office. The subject had quite a different demeanor from our previous meetings. Thus, these instances were lessons for me as a researcher.

In an effort to assure an on-going dialogue with participants, I did need to keep track of time and try to stay within the boundaries of what I arranged at the convenience of the subject. If my time expired, I then asked permission to go over by 10 minutes or, on the other hand, to schedule a follow-up interview online. In the cases when this happened, both participants agreed to go over the scheduled time.

It was important to let the participant speak freely and in a free flowing fashion. Yet, I had to keep him/her on track as best I could to make good use of time. This was a balance that I was be keenly aware of, made easier with Skype and the Call recorder that ticks away the time in front of the person on the recording end. Regarding the unstructured nature of the interviews, even information that did not seem pertinent at the moment needed to be noted however, in case patterns began to emerge over time. And they did indeed. Examples of things I thought I should note if I had seen them emerging were to be culture, social networks, collaboration, and trust factors. I kept this information together with my interview notes and it certainly paid off to do so to understand patterns in my findings, in particular trust.

Follow-up Online Interviews, Phase 4

In a second phase of face-to-face interviews, I wanted to re-interview anyone as needed. This second type was the *focused interview* in which an interviewee was present for a shorter period of time and the interviewer follows a more rigid set of questions to fill in any missing gaps in information. Yin prefers this type be used to corroborate certain facts. I also used this as an opportunity to try to gain network with future subjects by saying, “Who else might know about this subject?”

Site Visit, Phase 5

Face-to-Face Interviews

A visit to the site included any needed follow-up with in person interviews. The same guidelines I used in the previous sections regarding how I conducted myself during the online interviews were to be applicable here including: having preconceived topics while along the way being open to flowing dialogue and storytelling by the subject; keeping the subject on course yet allowing for free-flowing speech; using probes if needed to elicit more exact information pertaining to the questions; using the subject as a reference for others I should interview; and staying within the subject's set time limitations.

Direct Observation

Heavy observation was tantamount to getting a bounty of new information that I was not able to get via my online interviews. Erlandson et al. (1993) describes observation as allowing for all 5 senses of the researcher to work in the context of the subjects. I spent the majority of the week I was at the school doing observations both casual drop in (70%) and formally scheduled (30%).

In the Classrooms

I noted classroom decor (and ask how the decor is supplied or requested, if there are restrictions), the condition or arrangements of workspaces within classrooms, windows, location of teacher's desk, computers and any other technology items, how the students' desks are arranged. I noted who has computers, how many, if they appear to be being used or have a stack of books on top. What condition are the computers in? Where are the iTouches? Where are the interactive whiteboards? Are they all working? Is there a

telephone in the classroom? If during the interviews something had surfaced about the physical space, I carefully looked at all that was mentioned to me in the interviews yet I remained constantly open to soaking up new observations.

Within the classroom walls I noted how things work. I tested the wireless Internet to see if any filters existed (some but not a lot and they could be lifted at the request of the Tech Coordinator). I had determined these issues in advance: Who uses these particular computers? The iTouches? How often? How are they used? Are they handled with care? What happens when there is a technology issue – who appears and how long does the repair take? Does the teacher get a break if one is needed? Does the Tech Coordinator stay in her office or is she out and about all day in the classrooms?

In the Teachers' and Tech Coordinator's Offices.

I carefully observed the teacher's and Tech Coordinator's (TC) office decor, the condition or arrangements of workspaces, the proximal locations of classrooms, labs, TC's office, each with regard to the other. I noted: were there personal items in the office? Did it reveal any information? Did faculty have conveniences such as windows, office telephones, photocopiers, computers, and adequate space?

In the Principal's Office.

In my work with any administrators in their offices I noted similar things like what technology is in the office. And the following: Did it seem to be being used regularly? Did the principal use technology in daily work with faculty? What was the decor of the office? How does it compare to the teachers' workspace? What physical items were in the office? And, how are the chairs positioned in relation to the principal's

desk? Are there personal items in the office? Does it reveal any information? Since there is a new principal, I needed to question if things were arranged differently in the past.

In Other Areas of the School.

The other locations of my observations surfaced as I arrived at the site. It was interesting to see the Faculty Lounge, the work area for photocopying, teacher technical areas, additional meeting spaces and the like.

Meetings

With regard to meetings, due to the great distance it was difficult to schedule travel in accordance to School Leadership Team (SLT), parent involvement (PAC) meeting and SIT (School Improvement Team) meetings. I would have liked to have observed: Who sits where? How do they interact? Is the meeting free flowing or is there a planned agenda? What happens if someone has an item off agenda? How often do certain issues arise? Is there a pattern in what issues are arising at meetings? Who is posing them? What is the general atmosphere- is it stiff, antagonistic, normal or loose? What is the general demeanor of those involved? How do they address each other? Are they collegial or formal with their supervisors? With their peers? Is any technology being used during the meetings? By whom? If parents are present, how are they treated? What appears to be their attitude towards the administrators? Towards the teachers? Are they aggressive? At ease? Concerned? Are there any special accommodations for the participants like food or beverages? What does the physical meeting space look like? How does it compare to the teachers' work spaces? What technology is in the room? Instead, I did need to rely on the archival documents for these meetings, which in the case of the SIT, were available.

Archival Documents

Archival docs were read prior to the on-site visit and during. I was looking at organizational conditions such as rewards (tenure, recognition, sabbatical), time allotment (including release time), work arrangements, permissions to work from home or remotely, money (how is it requested? spent? allocated?) and technological resources, including on-site tech support (how are they requested? allocated? how much on-site support exists?), On-the-job learning. Are there experiential learning opportunities? Do the employees have the chance to expand current knowledge base plus learn new domains? Is this done formally and informally? Are they learning from each other or outside sources? I asked for manuals, departmental or school guidelines, legal documents, contracts, budgets, any previous documentation of interviews with teachers, staff or supervisors. I was forwarded many of these public items by administration and the head of the PTA.

Follow-up Work at a Distance, Phase 6

As needed, I did do follow-up work online via web camera or email to fill in any gaps in my information. This phase overlapped with my data analysis because in naturalistic research, there is an inseparable relationship between data gathering and analysis (Erlandson et al., 1993). As the human instrument, I was constantly revising, updating, adding, comparing, etc. up to the end.

Data Analysis

Erlandson et al. describe data analysis as an interactive dual process. One analysis takes place on the site immediately while collecting data. The second is away from the site. The process as described in the subsequent section is ongoing throughout. Thus,

where my data analysis began may not have been a clear date but it was early on in my data collection. I began my response to the first data by formulating a tentative working hypothesis that affected the subsequent interviews, in particular any probe questions. This was a very loose working hypothesis as suggested by Erlandson et al. but in no way restricted my data collection. At the end of each interview or observation, I asked myself what I had learned and how it affected my hypothesis. Then, my hypothesis began to shift as I let the data guide my study. Each new piece of information provided a small shift in a new direction whether it was by finding more respondents, suggesting new observations or looking for new documents. Based on the suggestions by Erlandson et al., I planned on the following:

Triangulation

Triangulation is a method of seeking out different sources of information about the same events of relationships (Erlandson et al., 1993). Stake in Denzin & Lincoln (2000) points out that triangulation reduces the likelihood of misinterpretation because it clarifies meanings using multiple perceptions to see the same phenomenon. I began to use triangulation to help me understand and verify the interrelationships of what I was looking at. This made my study more reliable and gave me some peace of mind that my data was valid.

Development of a Working Hypotheses

I needed to sort through my data and determine what themes were emerging. Erlandson et al. (1993) suggest that the researcher choose the hypotheses that "seem to best represent the constructions presented by the data sources" (pp. 115). Going into my interviews, I based my working hypothesis on the literature review and what I felt was

lacking. My focus was more organizational of course so I wanted to test the following: Many schools have the same or similar organizational conditions but not always the same administrative practices. Few schools report a success with technology integration. What conditions and or practices make Mary Scroggs unique? I felt that these may have had quite a bit to do with the technology integration, but I was not sure how: resources (especially technology support), rewards, time allotment, work arrangements and on-the-job learning.

Testing of Working Hypotheses

I was following Lincoln & Guba's (as cited in Denzin & Lincoln, 2000) suggestions for processing the data. First, the data was to be *unitized*, or in other words, broken down into the smallest bits of stand-alone information. This did not go well for me so I spoke with my adviser. He suggested a new method. Thus, in the end I took his advice and I used the method known as "chunking," which seemed to best fit the way I think. Secondly, I designated emergent categories until each unit has been added to a previous or new category. Some items were in more than one category. This process was a bit tedious and frustrating at times as expected but was well worth the effort. Then, I employed *negative case analysis* to consider alternate possibilities and address all of my "What if...?" questions. I continued this until no discrepancies remained. Next, I did what Lincoln & Guba call *bridging, extending and surfacing data*. There were several categories that seem linked. It is important to state that this was an on-going process, not one that began after the data had all been collected.

Chapter Four

Findings, Overview

The Mary Scroggs School turned out to be a very noteworthy case study. This is not a privileged private school by any means yet it is a success story with regard to technology use in the daily work of teachers and students. It is though a well-funded public school albeit with an ethnic and language mix. So what is it that makes it an *extraordinary* success case with regard to technology integration? After all, it does not boast a 1:1 laptop program. Rather, the school tends to prefer SMART Boards in combination with more creative, mobile and less expensive more reliable technologies like iTouches used too with some fixed computer stations and a few mobile lap carts, achieving an overall ratio closer to 1:3 or 1:4.

As I looked through the archival documents for my research, in particular the minutes from the SIT (School Improvement Team) from five meetings in 2009 and early 2010, I observed some of the routine expected topics such as testing, literacy issues, and maintenance to the school structure. It was curious to note that the one topic not really mentioned is *technology*. I believe this contributes to the idea that at Mary Scroggs, technology is not "new" or an "improvement" it is simply put another tool in the teachers' classrooms. It was obvious during my site visit that technology is a normal routine part of the day for teachers and students at Scroggs. No one struggled to turn something on, manipulate a tool like a SMART Board or a laptop and no one approached a machine with the look of a novice. This included teachers and students.

The case study itself had several phases beginning in spring of 2010. When permission was achieved, I began the period of Skype introductions with the interviewees

in September 2010. To achieve these, I researched Erlandson et al. (1993), James & Busher (2009), O'Connor et al. (2008), Madge, Shaw, & Wellens (2008), and Salmons (2010) as outlined in the previous chapter.

I conducted interviews and observed 16 professionals in their work at the school for various periods of time primarily in late spring 2010 and the 2010-2011 academic year. These included the new principal for 2010-2011, a long-term assistant principal, and much more extensively, the former principal and once assistant principal who was employed at Mary Scroggs for a total of 11 years since the opening of the school. I interviewed and observed the head of the PTA (also a parent) and the Executive Director of the PTA Thrift Shop. Additionally, I interviewed and observed the work of the Media Specialist, the Media Assistant, the Technology Coordinator (TC), the now former Technology Assistant (TA) and the most recent addition to the staff, the new Technology Assistant for 2010-2011 who also accompanied me the first day of my site visit drop-in visits. Those teachers I interviewed and observed on all days were one from each grade level First Grade through Fourth grade plus one dual Immersion First Grade teacher. I also interviewed one literacy coach and the Physical Education (P.E.) teacher. The P.E. teacher is the longest running teacher at Mary Scroggs, having been there since it s opening and also having served on the school design committee. Several of these professionals including one of the teachers I interviewed and observed the most extensively are also members of the SIT (School Improvement Team).

I did on-the-spot conversations with many of the professionals at the Mary Scroggs School who also enhanced this study in many ways. I dropped in on almost every classroom in the Scroggs School during my site visit yet there were only about 10

professionals who knew of my visit. Everyone was cooperative. The only exceptions to my drop-in visits were those classrooms in which students were doing intense work on projects for the end of the semester and my presence would have created a disruption for example, for the sake of audio recordings and presentations. This was the case with the Fifth grade students. Teachers at all other levels were very cooperative and forthcoming in answering all of my questions. There was only one teacher in the Fifth grade, whom I had requested to study, but she denied my request. She is known as perhaps one of the highest integrators at the school. She cited a lack of time as the reason for not being able to participate and again the issue of timing of my visit precluded the other three from participation.

In my interviews and onsite work, I gathered information regarding the administrative practices and organizational conditions. I found that those I suspected as having an impact did all seem to contribute to the integration, some to a much greater extent than others but in some aspects, not in the way I had intended. It would appear from my observations and interviews that there are three significant administrative practices and three significant organizational conditions that may have contributed to the successful integration of technology at this elementary school and seem to be maintaining it. Most of these are interacting and overlapping.

Findings Part One: Administrative Practices

Those administrative practices that seemed to have the most impact on the technology integration and long-term success appeared to be:

I. Money and Resources including tech support

II. Decision-Making

III. Recognition (informal rewards)

Money and Resources Including Tech Support

First, with regard to money and resources, I observed that the Mary Scroggs School has had certain and not ordinary administrative practices that contribute to funding and maintaining technology. In addition to a per student allotment, building-level decisions allowed by the district such as choosing to divert discretionary funds from textbooks to technology has permitted some spare funds. This was mentioned by two principals and the two technology staff members I interviewed. Although this is not a great deal of money, it is interesting to note that the district allows for this flexibility. Both principal and former principal mentioned that this allowed for suggestions from the Technology Coordinator with regard to purchases. The Technology Coordinator noted that this allowed for her to see what teachers needed and wanted and she was able to then consider these needs and desires when making suggestions to the administration.

Secondly, the PTA very actively and generously supports technology needs via money raised for the school. This money is a direct result of both enrollment numbers and parent volunteer hours. The work comes mostly in the form of hands-on labor sorting clothing and household donations at “The PTA Thrift Shop” (resale shop). It is extremely common that parents work volunteer hours for fundraisers in most American schools. Here though at the Mary Scroggs School, they work at the resale establishment. Then the non-profit Thrift Shop makes a payback to the school by check for funding enrichment items like technology. However, it was most interesting to note that “The PTA Thrift Shop” organization does not control what is purchased or how the money is allocated. Parents are very active in their volunteering at Mary Scroggs. The current head of the

PTA said, “This is Chapel Hill. We have a lot of very intelligent stay at home moms who volunteer.” But, the PTA also makes a concerted effort to do the following:

> We include parents from all backgrounds and make sure that parents from other cultures understand the role of the PTA and how they can help. We do brochures in Spanish and Korean, too.

She explained further:

> The PTA hires a bus to go pick up parents without cars for events. We even ask parents who would normally drive and have their own cars to ride the bus with the other parents. Everyone is included.

The PTA also charges a nominal fee for membership. This adds up as well and contributes to the smaller items provided for teachers.

There has been different leadership for the PTA in the past 12 years. In some years, they were not quite as active. Regarding the PTA activity, the former principal explains that it many times depended on who was at the helm as Director of the Scroggs’ PTA. Here she discusses an earlier year of the school’s existence, her first year as principal:

> We're in a neighborhood where we have a lot of parents who could be out being doctors and doing other things but they chose to stay home with their kids and they have this avenue of working at the school. And I used to say to a bunch of them that we should set up a bed for them there or something. So that we've had from the very beginning. You know but their organization, who are the current leaders of the organization, makes a difference in how things go. So…about the first year I was principal we had a treasurer who decided that there was a balance that they shouldn't be keeping, you know they were keeping this balance in their budget ‘just in case.’ And she said it's way too much, and so when that happened just because of who she was and what she knew about balances and money and stuff that probably other treasurers hadn't know, you know we started getting money from them just that's when we started doing our SMART Boards and things and it got to be one year where literally we could have had anything we wanted because—we just got so many things from them.

During my interview with the current Head of the PTA, it was obvious she is very active. She had a multitude of Power Point presentations at her fingertips on her laptop. She quickly shared them with me. When asked, she did specify that she was a former kindergarten teacher but had some experience with marketing. She had colleagues who were helping her; they likewise had experience with brochure making and the sort. She too indicated that she secured several liaisons to various communities represented by the ethnic spectrum of the school. It was obvious in our interview that she was dedicated to being certain all parents were included regardless of their language. She was clearly and genuinely devoted to the mission of the PTA.

At the end of the school year, the PTA at each school receives a check from the Thrift Shop. The former Tech Assistant recalled how the PTA receives money from the Thrift Shop proceeds and parent volunteer work and how this is applied to needs:

> The PTA …at the end of some years just came up with like, "Oh, here's $15,000 and we don't know what you want us to do with it," ….I don't really remember what they came up with as far as what they decided to do. I know there's some technology involved, but there wasn't any, like, big thing. I think a lot of those were just like, little things here and there that people wanted…

According to the Executive Director of the "PTA Thrift Shop," whom I interviewed in her office at the thrift shop locale, the resale business has been operating more than 60 years in this school district. Not only does the resale shop earn money from sales of used goods, but also from recycling. About 50% of the goods they receive in donations are not sellable and that generates about 500-600,000 pounds of trash every year. A company actually pays the "PTA Thrift Shop" to pick up their trash and haul it away. In her 6 years as Executive Director, she reports "between $225,000 and $300,000 dollars have been divided yearly between 17 or 18 schools." "Mary Scroggs' parents log

many hours, amongst the most of any participating school, thus their school receives one of the biggest returns from the thrift shop." The district allows for this outside funding and encourages it. The PTA thrift profits that go directly to Scroggs' account for up to $18,000 per year. Per pupil, then, this is an additional $26.00 the school gets for technology and supplies yearly. Separate from the Thrift Shop, funding through grants also occurs and is reported as being connected to the school's reputation. This is covered in a subsequent section.

The former principal too credits the long-time Technology Coordinator with being good at "squeezing every last penny" out of the funds for technology. She praises the TC for her wise decision-making and good choices including choosing more portable, reliable technologies like iTouches. The choices of technology come from teacher need, teacher suggestions and directly from the TC.

All teachers and staff interviewed feel that the Technology Coordinator and in more recent years, the Technology Assistant too, are both vital to the health of the school's technology effort for many reasons. There have been two TCs at the school since the opening. The first was in place for 3 years and is credited with laying the tracks for the current status of the tech program. Then, the current TC arrived 7 years ago. Prior to her TA being appointed 3 years ago, this TC, like her predecessor, was on site full time but felt she did not have enough time to dedicate to the teachers due to her need to troubleshoot the equipment. When a First Grade teacher, one of the highest integrators in the school, spoke of the support she receives both in time and in items she requests from the TC, she reported "I love [first name] to pieces. I could not do my job without her."

Every person interviewed at the Mary Scroggs School without exception felt that the Technology Coordinator position was imperative to the success of the school.

There is a curious result from the allocation of funding for the Tech Coordinator position. With regard to on-the-job-learning, according to teachers themselves, it did not appear that scheduled professional development affected these teachers more than their own personal dabbling with their laptops or home computers in their free time. Obviously this could have been different in the past when the school first began. Yet now there is actually a different type of on-the-job-learning going on at Mary Scroggs. That particular activity is related to the "co-teaching" that goes on in a one-on-one format with the Technical Coordinator and at times, the Media Specialist. This is covered more extensively in a subsequent section.

Decision-making

Secondly, and certainly forming some overlap with Money and Resources for technology, is decision-making regarding technology. The decisions are a prime example of how the Mary Scroggs School and the district to some extent allowed for decisions to be made from the bottom-up. Several key determinations regarding technology have been achieved in this fashion. One such example involves the issue that the TC felt that she could do her job better if she had a full-time TA in the school. She knew the teachers needed her more in the area of "co-teaching" in the classroom (and as a consequence, on-the-job-learning for teachers) yet she was spending most of her day troubleshooting technology in the school. Four years ago she suggested that a TA be hired full time. Because a TA earns half the pay of a TC, to fund this, she offered to work 50% time at Mary Scroggs and 50% at another local public elementary school.

The Tech Coordinator also felt that although she wishes the school were 1:1, she and the principals thought it best to rather spend on a TA, SMART Boards, iTouch carts and a few Apple lap top carts with Apple Care. The fixed computer station then could be used primarily for key boarding practice and not for creative work. The school also maintains approximately 4-5 fixed computers in classrooms and a small mini computer lab in conference rooms that are located en suite between two classrooms. There are additional hallway labs on the main wings. It was her decision to choose iTouches rather than more laptops. The former TA explains the choice of iTouches that was made by his supervisor:

> The batteries last forever. I mean, they last something like eight hours on a charge, which is also cool because these laptops suck. They're terrible… Sometimes kids or teachers forget to plug them in or forget to plug in the cart to the wall, but, you know, kids will pick them up, and then the battery dies after 20 minutes, which is just stupid. So the iPod Touches last a lot longer in terms of battery. They're much cheaper, per child, than a laptop. You know, $230 per unit verses $600 (or more).

Another such example of bottom-up decision-making came from this same Tech Assistant. He was in the lowest paid position amongst the technology staff members, that of Tech Assistant. Now, he has a Master's degree in hand and just been hired by a nearby county to be the new Tech Coordinator. He explains what his job was at the school for 3 years:

> So what I was doing as Scroggs was a lot more of a kind of low level techie stuff like updating computers, re-imaging computers, doing that sort of stuff, less of the actual teaching integration stuff, which, you know, I was paid accordingly.

Because this former Tech Assistant was, in the words of the former principal "a real people person" and "he walks the hallways," he was able to spot the way teachers used or did not use their computers. For example, he noted that if teachers had a laptop to

take home, they might dabble more with technology in their free time. Then, if they were connected to their school accounts conveniently, they could dabble at home and then quickly use what they created in their classrooms on the SMART Board. When this idea first surfaced, the then principal was not convinced. Eventually she bought into the idea and now credits the Tech Assistant with this decision. When I asked him why he felt the improvement was needed and pushed for it, he said upon observing the teachers over time, he realized that if they could take home their lap tops and "have dinner with them, sleep with them" and in such a way, they just might become higher integrators.

The former principal reported:

> I think that one of the best things we ever did was to go to the laptop for each teacher. And in the past I never personally thought that that would be as big of a point as it has been. It's like they're just, they want to do everything all the time with them. And I think that made a big difference. I just thought 'well there's a computer in their room, why does it have to be a laptop?' But it made a big difference, and I think that was a piece of what do you call it, 'pat on the back' for people. Because elementary schools in Chapel Hill don't have that, the way the district was doing their laptop for teachers they did high schools first and then they started on middle schools and then elementary schools were last. There may be other elementary schools, like the new one that just opened has it, but that makes a big difference as far as people's attitudes.

The former Tech Assistant explains how the teachers have freedom with their laptops:

> They are fairly unrestricted. I mean, if they were having serious trouble with their computers, I would look at them and re-image them and refresh them, and that's pretty much a school-based decision, that we are going to give them the laptops, give them control of – like pretty much give them control of the laptops so that they would be personally responsible for learning to use the laptops, learning to update them, like to keep them in good working order…They're pretty much responsible for doing their own updates. If they want to put a new piece of software on there, great. If there's something wrong with that software, it's not going to affect the other machine, so it's all pretty well self-contained, so we kind of let them do whatever.

It appears that as a result of this sort of bottom-up participation in decision-making, ease of requisition of needed items, and freedom to dabble with their work leaves teachers and staff feeling trusted. In all interviews across the board, teachers and staff members like the Media Specialist reported "I feel trusted," "I feel heard," "I feel my needs are met," "I feel I can go to the principal or assistant principal and ask for anything."

Recognition

The third administrative practice to be noted as having a likely contribution to the success is that of recognition. However, unlike what I suspected, this is not salary or even formal recognition like major district awards. Recognition is achieved in at least two ways at Mary Scroggs on a very local level. First, the PTA generously supports multiple, continuous, year long, small forms of recognition, some common to other schools as well such as "Teacher Appreciation Breakfasts" and the like. The head of the PTA at Scroggs reported "one of the greatest functions of the PTA is to support teacher morale." When one walks into the school, it is impossible to not note that there are obvious forms of informal recognition that abound from the PTA and others. One such example is the PTA has a bulletin board reporting whose classroom has parents working the hardest at "The PTA Thrift Shop." It features large color photographs of the teachers' heads but with cartoon bodies in running clothing. The teachers appear to be racing to a finish line. As the teacher promotes the PTA Thrift Shop work more and more in the classroom and parents' work, the teacher moves ahead in the "race." The head of the PTA also said "we portray the teachers as celebrities and we have one teacher, for example, come one particular night to the PTA Thrift Shop to work with parents." It is to be noted that all 15

participants who were interviewed at the Mary Scroggs School, current and former employees, praised the significance of the PTA support in the history of the school.

In other spots all over the school, one sees little but significant tributes to faculty and staff. Near the office of the Principal, Assistant Principal and the resource/coffee room, there is a "Happy Tree" on the wall. Any employee may jot down a thought about a helpful gesture, kindness or act of generosity that was performed at the school on a small piece of leaf-shaped paper. When an employee is noted on the "Happy Tree," a gift card for a local bookstore is raffled or given away. These funds come from the PTA. It was also observed that the new 2010-2011 principal received a few iPads to be distributed to the faculty and staff as she saw fit. She used one as a reward for the faculty members who read all the way through an extremely lengthy email one day. At the bottom she noted "If you have gotten to the end of this email, please send your name to the staff secretary to be entered into an iPad raffle." Then, an iPad to be used within the school by the employee was given away.

The former principal related her practice of recognizing people for small acts over time. Her theory was that when a colleague was recognized, another faculty member would try to emulate. The former principal explained four recognition scenarios. First:

> The Assistant Principal and I would trade off doing daily email messages. I did put a lot of things out there, you know, we would compliment people we saw doing things and we would put out suggestions for things. And it wasn't always technology, it was just all kinds of things. And then also with faculty meetings we tried to compliment people about what they were doing. When I was a technology specialist I used to do this thing I called "Technology teacher of the week" or something like that and so I would highlight one person who was doing what I wanted other people to do and it's amazing me because almost the next week, I would introduce them and have them tell what they were doing. The next week somebody would come and say I want to do what so and so had done. Well I would have never picked that that would be the person who would come, so it was like a mini staff development and it worked all the time.

She then related what the first Tech Coordinator did to give small recognition to those faculty members using technology:

> She did what she called the 'Geek of the Week Award' ... She would give a little prize…I think that's really important that people see that their peers are doing things and they want to do them.

Next, the former principal related how the purchase of something as minor as a piece of fruit and handing it out as a prize can be stimulating to employees:

> …The last year or two that I was there we tried to give recognition to people for working well together as a professional community. And we used to give out an apple— every time the secretary would go out the day of our meetings and buy a bunch of apples. And we would give an apple to everybody at a grade level because the grade level had done "such and such" or we would give them to individuals because they had done "such and such." And so we've done that for a long time, give out apples. And then last year we did a little bit more where we had people actually put on another mini staff development thing on what they had been recognized for. We used to give have a raffle every time, but that was just drawing names out of a hat kind of a thing.

Lastly, she relates how some small freedoms equate to recognition:

> …the school is like a block and a half down the street from a little market area and so people used to want to go up there and get lunch and bring it back. But they weren't allowed to leave the grounds. And so I said 'you know if you want to go up there for lunch and your children are covered or whatever it is you're supposed to do is covered and you sign out in the office so we know where you are, then you can go.' And so things like that people appreciate.

One teacher recalls how she appreciated that the former principal let teachers earn what she called "Snow bank hours" when teachers came to school outside of expected work hours for an activity.

> What [the former principal's first name] did was if you showed up and worked a four hour chunk on the weekends…So, say you went in on a Saturday 8 to12. That would earn you 'snow bank hours.' So, if we have, like, a snow day that, you know, kids don't come to school and they say it's an optional day for teachers. If you've earned enough snow bank hours, then you could just not come in. You also get snow bank hours for showing up at the garden. Our garden, like, had a big celebration and you could earn snow bank hours. It was a weekend thing. I went to the Walk of Education and you can earn snow bank hours.

A Fourth Grade teacher spoke of the reward not only of teaching but of being surrounded by good people. He also mentions another small moment of recognition:

> Because, I mean, the teaching, obviously most of the reward is in the teaching and the students learning, developing and you know, growing closer to them and having those bonds with them, their families. But in terms of what do you get out of working for Scroggs, I think … there are really positive relationships that are built within the school, whether its teachers and teachers or teachers with their assistants, and so I think that is a reward in and of itself, you know, getting to know some of great people that work here.
> Aside from that, I mean, today we had a delayed opening that was built in planning time that we have once a month, and today the Principal and another staff member made pancakes for everyone. So they had a griddle set up and they, you know, provided a breakfast for us.

He continued:

> We had a meeting last night, our faculty meeting where they chose three names at random and gave them gift cards to the local market. So just, you know, little things. And they focus a lot on sort of building a community and complimenting on another and doing the things that we keep saying that we need to do for our children, but doing it for each other, so noticing the good and celebrating all of the little things that are happening every day.
>
> And you know, they're not huge prizes, no one is giving you a BMW but, people do get these little acknowledgments of, 'hey, you're doing a great job,' I think people go out of their way to notice the good things that are happening.
>
> In the E-News they do a little teacher spotlight just to sort of introduce the teachers. We have a big cement frog that goes from classroom to classroom named Hoppy that is recognizing classes that are going out and planning in the garden a lot. We have the golden frog that is passed along from staff member to staff member, sometimes given to a …. grade level to recognize, you know, good work we're doing, and it's sort of held onto for a month and they give it to someone else at the beginning so, there's lots of little, little rewards going on.

As a likely result of this recognition, there were superfluous comments by faculty and staff in my interviews. "I feel respected", "I feel like the teachers are celebrated," "There is a great respect amongst the teachers and administration", "I feel like the admin

treats us they way we are expected to treat our students," "I feel I have to do my best work here," were just some of the comments from teachers. One of the most interesting comments came from the dual immersion teacher from South America who said at times in the hallways with former students "I feel like a rock star."

Findings Part Two: Organizational Conditions

Those organizational conditions that seemed to have the most impact on the technology integration and long term success are assumed to be:

I. Work Arrangements

II. Classroom Organization

III. School's Reputation

Work Arrangements

As suspected, the work arrangements at Mary Scroggs seem to very much favor and allow for knowledge work.

Design of Teacher Work Spaces

The topic of the design of the school was noted in my conversations with the administrators, current and former, the P.E. teacher and the Tech Coordinator. The school is a rather young school, opened in 1999. It was designed with the work of teachers in mind and the use of technology was a consideration. The first principal along with the P.E. teacher and a small committee participated in the design concept for the school. What one notes, however, upon arriving to the school is that it is not set up like most PK-5 schools for two reasons. First, teachers have personal workspace in their private offices and separate storage for decorations, manipulatives, and the like. They also have hallway,

shared access to printers and photocopiers. Secondly, there are mini computer stations everywhere one looks in the classrooms, adjacent workrooms and in the hallways and additionally, larger hallway computer labs in a few areas. Although, as the Tech Coordinator notes the school is still evolving with regard to technology considerations: "we still have some issues with concrete walls and weak signals. We have also been using Apple AirPorts and they have been very slow, especially when we log in. We are getting wireless soon."

The conditions that impressed me as having the most impact were noted via interviews and observations to be: teachers having nice offices adjacent to their classrooms (one shared office with 2 desks back-to-back and 2 book shelves with a large window adjoined to 2 contiguous classrooms), private telephone lines, which were previously important, yet now not so important due to personal cellphone usage, and very large storage closets adjacent to classrooms. Teachers have a fixed computer at their desk and a laptop for use in the classroom and at home if they wish. This laptop connects to the SMART Board. Classrooms areas are spacious, large and bright with a great deal of natural light coming in through many windows. Each classroom had up to 6 separate work areas for small group work (e.g. large rug for 24 students in front of SMART Board, work station in corner for books and audio, pod-like desk arrangements that can be used separately, a few long work tables with chairs or floor pads, a small computer station area with 4-5 fixed computers, and student desks.) It was reported that one teacher actually wanted to work at Mary Scroggs in order to have the storage closet.

In my on site visit I observed very quickly that the classrooms were all rather clean and uncluttered. There were many types of organizers in each classroom – such as

those basket organizer systems you see in high-end children's furniture catalogs. Everything seemed to have a place. This was particularly true in the first grade dual immersion classroom with a teacher from South America who has been at Mary Scroggs three years. Nothing was out of place. Everything was labeled bilingually and in her own neat handwriting. She had one bin for crayons, one for paintbrushes, one for thick markers, one for thin markers, one for pencils, one for colored pencils, one for index cards, one for scissors, etc. She had copious shelves for her baskets as well as neat stacks of various types of paper, flash cards and the like. When it came time for her to access a particular set of tools, she or her assistant immediately produced the item evoking the scene of a magician pulling a coin out from under his sleeve. This was particularly helpful to support the use of the practice of differentiation, which is discussed in a subsequent paragraph.

Additionally, each classroom with its storage closet and shared office adjacent had a shared conference room for work apart from the class, yet visible to the teachers via glass. This small workspace used for "specials" like one-to-one work for students and a professional, was composed of a work table with chairs, a small computer area with approximately 5 computers on desks, and doors to both the classroom and outside the classroom. In this sense, this school did not appear much like an elementary school. I noted that this space allowed for work apart that did not disrupt the classroom teacher's work with the rest of the class. An example I observed was that this space was used for work between a gifted student and her professional and later in the day the same space was used by a special needs student and her teacher.

Other factors minimized disruption in the teacher's work within a classroom. One such factor was having a Technical Assistant who wanders the hallways or is just a quick phone call or email away to assist when needed with SMART Board or computer issues. For the most part, the work of this professional was unscheduled. His time was flexible and his work was mobile. As a back up, when the TA was busy and the TC was scheduled or out of the building, the Media Specialist and Media Assistant in the library/media center were always available to help in a pinch. The Media Specialist states that the center has a flexible access policy for all books and technology plus "the doors are always open." At times too, it was reported by several teachers that if there were a minor technical glitch, the teacher may go into or through the shared office to collaborate informally with the other teacher for some quick tech troubleshooting. When asked, teachers noted that the convenience of a photocopier, printers and mini computer lab placement outside of all classrooms allow for fewer interruptions in their work.

Principal's office and Assistant Principal's office

In the principal and assistant principal's offices, I noted that the principal used her computer to access all bits of information she wanted to show me. She did not use a file cabinet or any paper folders I saw on the desk. I also viewed her weekly, lengthy email to teachers and staff. This was her primary means of communicating with teachers. In the past, this had been daily but the new principal felt that one weekly newsletter might better fit her style. Both the principal and the assistant principal too do weekly walk-throughs of classrooms and all common areas like the Media Center (library). The current principal reported that she feels she must live up to the reputation of the previous principal who was very technical and highly organized with her computer-based work. In the time they

spent together overlapping their work, the current principal noted an extensive array of technical skills in the former principal.

Technology Coordinator's Office/Media Center

The half-time TC (previously full-time) has her office in the Media Center's work area. Her desk is in a spacious room shared with the Media Specialist. The TC's desk is spotless and holds nothing much except her computer and brief case/computer bag. On a shelf, she has a few photos. She is constantly accessing information from her laptop during all of my visits. She is also on her cell phone quite a bit with staff at her other school where she works 50% time in the afternoons. Davidson (2003) offered one of the first glimpses into the work of the *educational technologist*. Her work is in tune with what Davidson found but at Mary Scroggs, the technology coordinator is not in fact the only "co-teacher."

It was reported by many interviewees as well as by the Media Specialist herself that although her function is primarily as director of the media library center, she too is very technical and "co-teaches" with (or without) technology alongside the teachers. She aids in lesson planning and design and frequently meets with teachers to brainstorm ideas. She has a flexible access policy, which means her doors are always open to teachers. The Media Center itself is also always open to students.

The former principal explains that it is no coincidence these two share an office:

> Because the media specialist….and our tech person….from the very first minute they shared an office, those positions, and they've always worked together. And the tech and media specialist has always worked with research, and then she works the research part and when it comes down to putting the project together the tech person is it. And that's sort of a way the State of North Carolina has aiming for that to go, but I think that the people we've had in that job, they just click that way and I think that's important.

Located nearby and just outside this office is another staff member, the Media Assistant, who sits at the reception/help desk in the Media Center in front of a large screen Apple computer. He aids teachers, staff and mostly students in their requests and needs. He is also very technical and personable.

During one Kindergarten dual-immersion class meeting that took place in the library, the Media Specialist presented a video she had made over the summer during a recycling plant tour. She showed this via the SMART Board in the Media Center's main seating area. When the 10-minute presentation ended, the Media team joined in with the teacher and teacher's assistant to help the kindergarten students do a bilingual *Wordle* on laptops at the end of the lesson. They then grabbed a laptop from one group and connected it to the SMART Board showing one of the *Wordle* creations. Later, the Media Specialist then uploaded all the *Wordles* to the next day's Ribbit News broadcast (the school's morning announcement videocast shown via the SMART Boards in each classroom). Both of these professionals, even while located in the Media Center, were "co-teaching" with the Kindergarten teacher and teacher's assistant.

Located just outside the office of the Tech Coordinator and Media Specialist, is the desk of the new Tech Assistant. He has replaced the other who has just left to take a promotion as the TC at another school in the adjacent county. The TA is a young professional paid approximately half what the TC is and his/her responsibility is the trouble shooting of all of the equipment. The Tech Assistants each were reported by all interviewees as being a true "people person" and one who walks the hallways to help teachers on the spot. If not out and about, they are easily located in their central offices. Interestingly, the new TA even asked that his office be located in the hub of the action in

the Media Center rather than a bit more isolated in the larger fixed lab. He had just started three weeks prior to my visit and his desk remained covered with welcome gifts like balloons, coffee mugs and treats along with little notes from his new colleagues welcoming him to the school.

Classroom Organization/Differentiation

Secondly, and forming some overlap with the work arrangements, would be the dedication in the school and district to the educational practice (and now, as a result, the classroom organization practice) known as *differentiation*. This practice has been in place since the school opened and is the way that all teachers must work. This mandate came from the district in 1995, 4 years before the opening of Mary Scroggs in 1999. Differentiation is gaining popularity in schools. It works something like this: the teacher divides students into small groups according to need and level. In each classroom of 24 at Mary Scroggs, groups are composed of 4-6 students. Each teacher seems to group students in a slightly different way but with the same end goal in mind, to provide differentiated instruction to each group. This practice, unlike simply doing the same work in small groups across the classroom at the same time, actually rotates the work and at times, different groups do not even all achieve the same work in the same day. In one Second Grade class, the teacher calls these *cycles*. She rotates students like the parts of a high performing Swiss clock.

In a First Grade classroom, the teacher first shows the Ribbit News broadcast to the entire class as a group, the teacher then does a song activity with her class, and next goes over the day's objectives. Then, they divide up quickly. While one group works on audio books at a corner table, another group works with manipulatives (wooden sticks,

blocks, etc.) sitting in a circle on the floor, while another works with flashcards at a work table, another sits at the fixed computer stations, another at the SMART Boards and on some days, possibly with laptops. The teacher and teacher's assistant go from group to group or stay with one group if the need is greater. After a given amount of time, the whole group meets back in front of the SMART Board for one other teacher-led activity and then breaks up again into groups to continue working on their various activities. This practices continues the rest of the day with the full group coming together approximately every 40 minutes for a short activity. In a dual immersion First Grade classroom, that group activity was a story read in Spanish by the teacher's assistant while a SMART Board generated Power Point showed pictures of the story as a way to clarify the Spanish for the native English speaking half of the class.

In a Fourth Grade classroom on the day I was observing, the students are recording podcasts about a book they've read. This recording though is not being done by all students at the same time. The teacher goes over a brief review of how to record the podcast on the Apple laptops. Next, approximately 2 groups of 5 students grab laptops and know exactly what to do to get their work done. They meet briefly in their two groups and then spread out to various parts of the building wing to find a quiet spot to discuss their book. At this time then, the teacher is only in charge of 10 students on laptops. There are several other laptops in the back of the classroom waiting to be used. When asked, he reported that if there had been a technical glitch, he would have just swapped out the laptop with another. While these students take off to record, the teacher then begins to work hands-on with the other groups still in the classroom. Each group is doing a different task. He is aided by his teacher's assistant who also walks around to

work hands-on with the groups. The teacher later reported that the rest of his fourth graders either did their recording the previous day or would do it over the next two days. This practice was interesting. Although there are enough laptops on mobile carts to accommodate all the students at one, differentiation has them working in smaller groups. The teacher does not have to orchestrate 24 students on laptops all at the same time. And, if one did have a technical problem, he would simply switch the laptop while the other groups continued doing their work.

My observations are that at Mary Scroggs this educational practice maintained the interest of students, facilitating discipline and orderliness, minimizing interruptions to the whole class, and seemed to help the teacher manage technology. While the teacher is only working with a small group and some piece of technology, there is no need for him/her to be front and center with 24 laptops, for example, as might be the case in a 1:1 laptop program school. Although I did not observe any failed attempts with the SMART Board, the interviews revealed that if the SMART Board activity failed, it only affected one group, not all 24 students. Then, the teacher could quickly grab an activity like a handout from a file cabinet for that small group. First Grade teacher Jessica Thompson said that if some piece of technology fails, I just "pull an activity 'out of my back pocket' for that group and keep going." I saw this practice in every classroom of the school during my walk-throughs every day. In a Kindergarten classroom, it kept the kids in their seats for extended periods perhaps because they knew they would be moving on soon. In a Third Grade class meeting in the fixed computer lab, the students were all working on different projects including a group of five students painting at a large table in the lab. I found this unusual that paints would be allowed in the computer lab but, on the other hand, it seems

part of the general flexible access attitude in the school. As three people stated, “we just want them to use the technology.” In a Fourth Grade class where students were recording podcasts of books they’d read, the students who were working on the laptops were allowed to scatter all over the building wing to any quiet corner without need to ask permission. Other students worked in their small groups on other tasks in the classroom.

Professional development activities support teacher use of differentiation. Although it has become the standard way things are done, there are literacy coaches who work hard in tandem with teachers to maintain this practice. Equally, the Technology Coordinator must plan any “co-teaching” she does with teachers to meet this need.

School’s Reputation

The third and last organizational condition that appears to have influenced the integration and success of technology in the school is that of the school’s reputation. My general feeling is that the majority of the teachers in this school are high performers capable of any innovation with which they may be challenged. Across the board and without dissent, all 15 current and former employees interviewed said that Mary Scroggs is a “nice place to work.” Comments included that all employees are “good people,” “friendly,” “caring,” “supportive,” and “dedicated.” One Fourth Grade teacher claimed “although everyone may not be contributing quite as much as the next guy, there are just no slackers.”

Even when not directly asked, all teachers and non-administrative staff except one spoke of how they ended up at the school and what occurred in their employment interviews. I noted as I was progressing in my interviews that without asking, most participants in my study had said that their advisers in college or graduate school or their

former educational employer had known the reputation of the school as being one that "integrated technology" and was a "good place to work" or a "nice place to work." Obviously this began to emerge as important information and it helped me adjust my working hypothesis. Two of the employees who arrived from the Midwest said they had Googled the school after seeing the job posting and noted the publicity it had received as early as 2002 from the George Lucas Educational Foundation as being a school that integrated technology. They felt this would be a good place to work although like most other teachers, technology was not formally pushed in the interview.

As for longevity in the school, the Physical Education teacher is in her fifties and is not only the longest running teacher at Scroggs but also one of the highest integrators. She formally orchestrated the daily Ribbit News videocast when it began and even requested a SMART Board for the gym and uses it regularly. She stated: "I need to be working in a place where I feel like I make a difference." Then she said, "The people who are good with technology are all doing so many things." She reported that it was not the school district or administration that pushes her to continue to keep updated with technology. This teacher is a self-proclaimed "Type A personality." She is high energy, motivated, good at multi-tasking and juggles many projects at once. She pushes herself. Her sons are in their early twenties. She sees their activity with technology on a daily basis and she pushes herself to excel in order to keep up. What happens when a teacher doesn't keep up?

A noteworthy event was mentioned in an interview with the Assistant Principal. She said that a teacher with 30 years of experience had chosen to leave Scroggs the year before due to the pressure she felt as being unable to keep up with the technology being

used. In a one-to-one meeting with the Assistant Principal, who offered to help her with more support if she would stay, this teacher denied the help, saying she felt the pressure was from her high-performing co-workers, not the administration. She chose to leave and teach at a local charter school.

Lastly, and also very noteworthy is that the Technology Coordinator reported "the school's reputation of high technology integration helps us get grant funding — because they know we'll use it." This was repeated by the K-2 Literacy Coach, who many times gives her free time to help faculty write grants. On several other occasions too it was noted that this reputation helped secure technology. The Physical Education teacher, the only original teacher still at Scroggs since the opening in 1999, related another instance of reputation helping the school get technology. She said: "Two years ago I received a free class set of iTouches for a project so students were able to track fitness testing. It was through the Virtual Public Schools project. The project was pulled by the creators due to budget cuts but we got to keep the iTouches." She did say though that this came at a cost to her and the Technology Coordinator due to the time they put in to the project but in the end it was great for the school.

Chapter Five

Conclusions

To return to the original research question, *what are the administrative practices and organizational conditions that may promote technology integration?*, three practices appear to have the most significant impact. First to be noted is money, much of it coming from external funding like PTA support and grants. Teachers having some control over funds or at least an easy gateway to requesting funds is also a significant factor. They feel they can try new things and request what might be needed to dabble in new things. The district also allows for building level decisions on certain items like textbooks vs. technology. The principals have relied on the Technology Coordinator to assist in identifying needs. The TC also relies on teachers for ideas.

Resources allocation is certainly part of funding and includes technology support, particularly in the form of having both a tech "co-teacher" and a troubleshooting tech professional on staff. Tech people are not usually known as being " a people person" thus having at least one tech staff member who is flexible, walking the hallways and readily available for trouble shooting is quite different. At Mary Scroggs it was noted that both tech staff members had been former teachers thus they were oriented to teaching. They work with the teachers one-on-one to achieve a type of "co-teaching" such as that first outlined by Davidson (2003). These tech staff members had a feel for both teaching and technology.

When working one-on-one with the teachers often over a three-day period on one activity, the teacher's sense of understanding of the technology to be dominated was reported as being elevated. It also allowed the teacher to see troubleshooting first hand

when it arose during their in-class sessions together. Not only is this one-to-one on-the-job learning but it also provides a type of collaboration between the Tech Coordinator and the teacher, one that not only offers advice and real time technical support but also emotional support as the teacher learns to grapple with any new technology. My original model prior to beginning the research sought to find if professional development had to do with this success and long-term maintenance of technology at Mary Scroggs. Although there are various formal professional development topics presented at least once a month, and there may have been more of it in the past related to technology, this one-to-one learning emerged as the most significant.

Working in this way with teachers encouraged them to try new things. Teachers knew that they could first run their ideas by the TC for feedback or simply solicit any new ideas directly from the TC. Teachers have the tech help, resources and funds to dabble. They also have laptops to take home. Their work was not mandated or regulated and the control over their experimentation was loose. There was no day on which the administration declared a new tech plan. It simply became seamlessly integrated into the curriculum.

A second practice overlapping with funding and allocation of resources and noted to have significant impact was decision-making in particular as it emanated from the bottom up. This was most obvious when conversing with interviewees about technology acquisitions like the laptops. Most decisions regarding what to purchase came from the TC, TA and the teachers themselves. This decision-making path resulted in the teachers and tech staff saying they felt heard and respected.

It would appear then that when many small-scale things are going on in a school and there is "co-teaching," organizational learning is promoted. Other teachers pick up on the new work, especially when it is recognized, and then they try to emulate it. The former principal explicitly noted that she saw work emulated after it was recognized even with a reward as small as an apple at a meeting. After all, it was not the reward rather the recognition that made the difference. When experimenting like this, what does not work is tossed aside. Thus it would be assumed that if there are many small projects going on rather than a district-wide mandate or a school mandated 1:1 laptop project for example, that failure results only in continuing to dabble. Teachers do not become frustrated and drop off. They simply move on. If it goes well, they continue to dabble and replicate what they have done with colleagues. In this way technology becomes an organizational feature of the school.

The recognition a school can provide to a teacher appears to also have significant impact on the success and maintenance of the technology. The rewards need not be great. Recognizing the efforts of teachers in small, consistent ways seems to be most significant. In many cases, it would appear that teachers are willing to do extra work, stay at school longer hours, dabble in class with technology, do more work in their out of classroom time, and experiment more with technology at home on their own if they feel respected, heard, appreciated and valued.

One consequence of recognition and respect is the school's reputation, an organizational condition. Word of mouth promotes the school as a good place to work, one with employees who are happy and respected. The reputation boosts the quality of

the candidates who seek work at such a school as well as serving as a filter to keep out those who are not hard workers or willing to at least try to work with technology.

A second condition seems to be work arrangements that favor treatment of the teacher as a knowledge worker. These conditions were a personal space such as an office not within the classroom, personal tools like telephone, computer, laptop, printer and photocopier, and a large storage closet. These conditions were noted as likely to have contributed to the teachers' ability to multi-task, have fewer interruptions, manage the classroom with technology and overall, contribute to the aspect of respect that the teachers feel.

The third condition that appears to have made a significant impact on the technology integration is the classroom practice of differentiation. When the challenge was to change teaching rather than strictly to add technology, the teachers in this study found that technology supported this effort. Rather then being told "Here is all of this technology, somehow use it in your teaching," these teachers had a need to integrate it to support their new way of teaching, differentiation. Christensen (2008) shows how technology does support different learning styles. It is then a logical fit. At the time Mary Scroggs was founded in 1999, teachers were told to use differentiation. It had been a district policy since 1995. The principal was warned that it would not be necessary to buy classroom sets of any technology because they would not be utilized all at once. They used technology as only one of the tools in their repertoire of instruments to achieve this. They also use flashcards, manipulatives like wooden sticks and blocks, crayon and whatever was needed to appease the new differentiated instruction. Although it may seems a paradox, if schools have a need for technology rather than simply being told to

use it, there is a greater likelihood of success. This harkens back to what Zhao & Cziko (2001) surmised; if teachers have a need for technology they will use it.

With regard to my initial research question, *what are the administrative practices and organizational conditions that may promote technology integration?*, in my findings, time was noted as being distinct from what had been suspected prior to beginning my research. It appears that the teachers have no additional scheduled or allotted time for preparation, work or personal reflection than other teachers. This was corroborated with an in depth look at the published work schedules of the teachers. There are some set moments of time for teachers to use for preparation such as delayed opening once per month, but they appear to be very comparable to that of other schools. If anything, it seems that time is though a factor in that these teachers take home their laptops and dabble or work on lessons more than some other teachers may in their own *personal time*.

As was gleaned from the literature review, teachers simply do not have enough time to do what they need to do during their workday. A Fourth Grade teacher reported "When I have five groups that are reading five books I have not read, I'm reading five different books at once. So I'm spending at least an hour or two at night at home beyond planning and other stuff." He later said of his out of class workweek "I would say a conservative estimate is that I spend 10 hours outside of school on work." Kennedy (2005) notes that this is common to all American schools unlike teachers in other countries that have far fewer hours in the classroom each day. At Mary Scroggs all of the teachers interviewed reported spending personal time at home on dabbling with computers and adding technology to their lessons. They reported spending up to 1-2 evening hours on lessons and a good chunk of time on a Saturday or Sunday. This could

be attributed to the fact that the school's reputation seems to attract high performers. Too, the school spends a great deal of effort recognizing the teachers and rewarding their efforts, primarily with small rewards or simple forms of recognition.

Practical Implications of Study

The practical implications of this study are numerous. It may be that professional development with technology should be considered in a different light. Teachers who are not particularly technical are able to have some basic troubleshooting skills via "co-teaching" from the Tech Coordinator and even others like the Media Assistant who is always at his desk and willing to help. This on-the-job learning is training time for teachers using technology. Many researchers if not most, also mention constant computer glitches and technical problems as a deterrent to technology integration or long term success. I did not note these problems plaguing the teachers at Mary Scroggs during my onsite observation, interviews or in any archival documents. With regard to the administrative practices aiding in this success would be the way financial and technical resources are allocated and the way decisions are made. Mary Scroggs is not a 1:1 laptop school although, in theory, they could afford to be. The school chooses to have less technology along with both a half-time Tech Coordinator and a full-time Tech Assistant along with other helpful professionals like those in the Media Center. This allows for "co-teaching" to troubleshoot on the spot tech issues and also help readily available from the wandering Tech Assistant when the teacher is working alone. The "co-teaching" also stimulates learning of teachers and their technology, lessening the need for troubleshooting by other professionals.

From a practical perspective, it almost seems as if differentiation ended up supporting the technology integration and not the other way around. In the case of Mary Scroggs it is a bit easier to study because the school is so young. Differentiation was practiced from day one, a timeline then that helps us to see how technology fit into the plan. The teachers had a need to find various activities for different levels of learners. As Christensen (2008) maintains technology serves this purpose in schools. Various learners have various needs. Technology can accommodate all of those needs unlike a typical textbook, which addresses one style of learning at one level. What is obvious is that the teachers had a need for technology because they had changed their teaching. This, again agrees with some of what Zhao & Cziko (2001) amongst others maintained with regard to teacher use of technology.

Future Research

As a consequence of the need for more and flexible-use tools to support the new teaching practice of differentiation, these teachers appear to have embraced technology in ways that others did not. After all, they really did not use computers just for keyboarding. They used smaller, more portable and creative technologies with varied uses. For example, the iTouches are used on the student desk as a resource tool (dictionary, encyclopedia, calculator) and as a listening tool for publisher or even teacher created podcasts, for sharing student-created original stories that they recorded on the iTouches and then took out during their walking time. The laptops were also not ever used strictly for keyboarding. They were used primarily for presentation that included audio or video that was easily recorded in GarageBand and then added to the presentations. It may be interesting to find another school that has had a great success

with technology to see if the conditions and practices were much the same as those found at Mary Scroggs.

Secondly, what does this say about innovations in general? Teachers needed the technology so they integrated it. They continued to dabble with it and experiment alongside the Tech Coordinator. They learned to manipulate it on their own to a certain extent at least until they came up with a fresh idea or emulated a new idea from a colleague and then had the need again to work with the TC, in reality a "co-teacher." It would be interesting to see if other schools with similar conditions were able to implement new innovations in the way that Mary Scroggs has with technology.

Too it was noted that this school had overall organizational conditions and administrative practices that were looser in their control than some schools might be. Does this provide a better environment for change? Is it that the employees do not find the new work so hard that they decide to drop off or leave the school?

Other new factors emerging in this study and not seen in the literature review could equally contribute to future research in this area. Primarily, I feel it would be useful to research the possible relationship between the classroom organization of rotating small need-based group work called *differentiation* and technology integration. This practice that does not require the teacher to be front and center with a classroom full of students at computers and as a consequence seems to minimize disruption in the teacher's work with technology and in the classroom in general. This educational practice has become an organizational condition in the Mary Scroggs School and appears to contribute greatly to the technology effort. Though, it is difficult to separate the high performing teachers from

the practice of differentiation, as pointed out by M.M. Kennedy in personal correspondence (February, 2011).

It is also noteworthy to mention that an overwhelming amount of the literature mentions collaboration as key to technology integration and innovation. Spitzer & Stansberry (2004) are amongst the few authors who report high integration with a lack of collaboration. The high integrators at Scroggs used the word *collaboration* frequently though I did not observe or hear about a great deal of collaboration as it is traditionally known by the literature. There was one group of teachers in one grade level that seemed to share course work greatly and collaborate much in the sense that is described by the literature. Yet, I did not note as much collaboration of this sort as I had expected to find given its emphasis in journals.

The former principal explained their usual formal collaboration in this way:

> I think they really work hard when they're in their meetings. They have a specific guideline that they should be working on like looking at the tests, looking at pretests, looking at post test, figuring out which kids need work, making sure that the kids get it, making the tests, I mean there's a whole bunch of things that they have to work on.
> We had a teacher one year that came just like a second year teacher. She thought we were going to be collaborative and we weren't really at that time. And she was really disappointed, but I think we moved past that.

These teachers nevertheless do greatly respect each other and seek each other out for joint work on some lesson plans and minor technical help but according to the data, more so for emotional support. My general observation was this was not collaboration as found in the literature, rather *collegiality*. My observation was backed up by the report from a foreign dual immersion teacher who upon arriving to the school was immediately struck by a lack of collaboration in the sense that she had known it. I did see that on-the-

job-learning ("co-teaching") was collaborating directly with the Technology Coordinator. It could be that this collaboration is actually more important than collaboration between like colleagues. Both Davis (2008) and Adamy & Heinecke (2005) have suggested the critical nature of collaboration with key tech players. At Mary Scroggs there was also a great deal of this going on with the Media Specialist, who by the way, just happened to also be very technical. In either case, the tech people were helping side-by-side in the actual teaching.

Another possible future topic of interest could be related to the school's reputation. How does the reputation of a school affect its ability to attract good hires? If a school has a strong reputation for a hard work ethic, does this filter out weaker candidates?

Knowledge Work: A Final Word

What are the conditions appropriate to knowledge work as mentioned in the literature review of Chapter Two? According to Davenport (2005), the author who has written most extensively on this topic, they are: a work space for concentration yet a space to collaborate when needed, a flexibility in when and where the work is performed, loose controls and the freedom to experiment, plus participation and collaboration albeit with a certain degree of autonomy. Knowledge workers like to bounce their ideas off colleagues as well. They do not easily share their work if forced to but they do collaborate when they feel like it, in particular to show off their work. Knowledge workers like to be recognized and it is not necessarily through salary that this needs to be achieved. Many times it is simply smaller more intrinsic rewards like a verbal "pat on the

back" at a meeting. And with regard to technology added to work, time to learn, tinker with and fix the technology is required.

In conclusion, I found that the Mary Scroggs School was set up for knowledge work and particularly with technology added to that work. This does not seem to be common for schools. The work conditions appeared to promote effective work. Teachers have personal space when they have their small breaks. The shared offices helped if they had a quick technical question; they oftentimes first sought out the teacher in the connecting classroom. They have their laptops to take home as needed, they have their machines like printers and photocopiers nearby, they have bright, cheery work spaces both in the classrooms and in their offices. The classrooms themselves have organizing tools like baskets and shelving plus various workspaces to support differentiation. One of those workspaces is an area with 4-5 fixed computers. Another is a large worktable capable of holding a group of students working on laptops. iTouches can be used on the desktops for quick reference or more sophisticated activity like voice recording. Yet all of these areas can be easily converted for use with pencil and paper, markers, flash cards, books or wooden blocks.

It was mentioned by most teachers that it was relatively easy to requisition the items they needed to do their work – supplies, art tools, décor for the classroom and even technology. They also mentioned that as a consequence of this and other favorable treatment they encountered, they felt heard, trusted, respected and appreciated.

What does not work with knowledge workers, according to Davenport, is top-down re-engineering. Imposing a new process on workers is difficult. This could be why so many schools have trouble when a mandate comes in from above asking them to add

technology. In this case, the teachers had changed their teaching and technology fit in well. They had the tools they needed and it was not difficult, nor time-consuming to acquire them. They had the support and guidance one-to-one to experiment and see what worked for them and what did not. As we recall from Davenport (2005), it is important to create conditions that favor collaboration without reducing autonomy, a hallmark of teachers' professional character. It seems the "co-teaching" with the technology coordinator and others at the school does exactly this.

Thus it would appear that the findings support that the success of the Mary Scroggs School has much to do with the teachers being treated like knowledge workers and having conditions appropriate to knowledge work. Having tech and media staff as co-teachers and as colleagues to troubleshoot problems as they arise, problems they can later deal with more easily on their own, seems to have been another key factor in the success of the technology integration and its long term maintenance.

Considering the findings in this case study, what does this tell us about other schools? It was found that teachers were not paid extra to integrate technology nor were they given any release time from other duties. Innovative and committed teachers were not rewarded with cash or even luxurious prizes. At times, the reward was as simple as an acknowledgement in an email or at a staff meeting. Personal mastery is recognized in others and it is celebrated. In many cases then it becomes emulated.

There is flexibility in this school. Some tasks require both teachers and tech or media staff to wear more than one hat in a day. It is routine for them. For years one teacher created the "Ribbit News" broadcast every morning at 7am without ever asking

for compensation. Almost everyone interviewed shared a story about a colleague past or present who went above and beyond what was expected.

There is flexibility with access to tools as well. Flexible policies exist with technology equipment, in media areas and other tools. People are using the tools. The controls are not tight on this work or these tools. The administration and the PTA maintain a "tell us what you need" type of policy. Then, there is a knowledge that it will be used by many teachers.

The atmosphere at the school is collegial and respectful from the top down. Teachers pride themselves on their hard work and enjoy their stimulating work environment. They do not reach for the same lesson plans year after year. They innovate. Some tasks require the teachers to work together and some do not. The school has earned a reputation for technology integration and hard work. Too, it is known as a good place to work, a school with friendly people. The organizational conditions make it such. They are set up for good work and with the teachers in mind. The students are the winners in the end.

As typical with a single case study, which is often utilized when a case is an anomaly, there is no way to compare this school to another at the moment. We do know from the literature to date that even 1:1 laptop schools in Silicon Valley have not managed this success. If though what happens at Mary Scroggs is any indicator of how technology can be integrated into teaching, one can wonder whether it is only with technology or if any other innovations could come about under similar conditions. This school is not 1:1 with regard to computing. If it were to be though at a future date, one would know that first it achieved great success without that expenditure due to hard work

and good planning. Secondly, it would be clear that any technology purchased for a school like this would be used well. The school's success will only grow more remarkable.

Appendix A

Technology Use in the Daily Work of the Mary Scroggs School

Ribbit News

Each day at Mary Scroggs starts with a **news broadcast**, much like in other schools when the principal or another staff member makes announcement over the loud speakers. Here, students create the broadcast 3 days per week in conjunction with the Technical Assistant. The other two days per week feature the Assistant Principal or another staff member such as the staff Social Worker. The broadcast was previously live which became burdensome for the staff participating. Then, it was more recently available on the Internet for parents to watch from work or home but there were few parents who voiced security concerns. It is now as of 2010 being done with VoiceThread and then posted on the school's blog for parents to view daily via each classroom's home page (log in required). The "Ribbit News" is created by students, teachers and tech support on a rotating basis. It is shown in each classroom early in the morning when it suits each teacher's schedule. It appears via the SMART Board in combination with a laptop.

SMART Boards

There are SMART Boards in every classroom (4 at each grade level PK-5) and in the Gymnasium, Music and Pre-School. Each of the 24 grade level teachers is trained in SMART Board, uses the SMART Board and has been encouraged through various professional development opportunities to deconstruct their previous work and

reconstruct it for this technology. Many of the paraprofessionals have some knowledge also of SMART Board.

Students interact with the SMART Board throughout a typical class session all hours of the day. The First Grade teacher uses it nonstop, even at times when other activities are going on in various corners of the classroom on computers or with audio devices. First and Second graders often access online resources via the SMART Board like EducationCity.com (various exercises) and Razz-Kids.com (an online reading library) which have interactive whiteboard activities. A Second Grade teacher uses the SMART Board in many different ways throughout the day yet does not limit herself to drag and sort exercises. She actively uses the clickers for Math and Social Studies. In each classroom (PK-4, excluding Grade 5) I visited for my site visit, the SMART Board was used actively in engaging ways. I focused primarily on visits in K-4 classrooms. Students from K-4 were extremely enthusiastic and anxiously awaiting their turn to walk up and manipulate the task. In every classroom I visited, there was no one student or teacher who hesitated for even a moment in his/her intention to complete these activities. The command the teachers had over their laptop to SMART Board interface along with the command students K-4 had over every activity without hesitation was evidence that these were used actively.

Mary Scroggs has one of each 4 classrooms at each grade level K-2 doing dual immersion for Spanish-English. (There are also ESL teachers. More than 20% of the students are either in dual immersion or ESL classes.) One dual immersion Spanish teacher in First Grade uses her SMART Board very actively throughout the day. Once, she was explaining a popular recipe to her students. On the spur of the moment, she

walked to her laptop and logged into Skype. She called her family in Colombia. All family members gathered in the kitchen in Colombia with their laptop and webcam and began to do a live cooking demonstration of the Colombian recipe the teacher had been trying to explain to her class, now broadcast live on her SMART Board. The teacher reports now that since that moment she frequently accesses Skype and Google Earth via her laptop and SMART Board. It was evident in my observation that she and her students use this technology all day long on a daily basis. When appropriate, much like the First Grade teacher, she uses manipulatives, crayon and paper or pencil and paper to accomplish other tasks.

Teachers have an individual laptop that they can take home as often as they like to create original activities. These connect directly to the school SMART Board. Teachers can pull any information they like from their laptops and present it. If at any time there is a question pertaining to an older topic, teachers simply search their laptop and show a past activity to answer a question. The SMART Boards are praised for the ability to allow great interaction and quick reviews of past lessons as needed. Recycling is of course a major component to Elementary education and this is no exception at Mary Scroggs, which has a daily recycling time known as "Pollywog University."

A Second Grade teacher is very adept with SMART Board and offers a weekly, informal brainstorming session after school for fellow teachers on activities, which she calls "Are You Smarter than a SMART Board?" Other teachers frequently praise this colleague's dedication to this unpaid professional development opportunity.

Students learn to interact with the SMART Board beginning in Kindergarten. In First Grade, most any student is capable of turning it on at the beginning of the day,

logging in and navigating to their class page. There is a SMART Board in every classroom, the Media Center/Library and one in the gym. The P.E. teacher, who is 54 years old, requested a SMART Board and uses it actively. At times, she uses it in combination with iTouches for demonstration of wellness activities that calculate heart rate, etc.

Computers (fixed and portable)

Each classroom has 4-5 fixed hard-wired stations, there is a hallway lab with 10 workstations, one lab with 25 work stations and 4 wireless laptops on a mobile cart. Each teacher also has a personal use laptop, one that he or she may take home as needed. Additionally, two connected classrooms have mini-glass enclosed computer and work stations for individual work such as children with special needs. These stations can be viewed by the grade level teacher from inside his/her classroom. At the teachers' disposal are 3 iTouch carts for Fourth and Fifth graders and laptop carts for all grades.

In First Grade, most any student is capable of turning it on at the beginning of the day, logging in and navigating to their class page. Each day the class logs in to their own class site to check news and homework. This is also the log in for the equipment use in class. Most students know how to use the computers extensively and on their own by Fourth Grade. In one Fourth Grade teacher's classroom, Fourth graders work on recording book reports with GarageBand. They grab laptops and scatter to various parts of the building wing to find a quiet space to record.

Students who are able to write do blogs housed on class pages. Fourth graders participate in "Ning" book discussions about books they've read on www.blog.ning.com,

while students in another fourth grade class do their book reports in Podcasts or using GarageBand.

In the lower grade levels where students are not as sophisticated with words, students create iMovie or VoiceThread presentations. To create the movies, students and teachers are manipulating....

Flip Video Cameras

Flip video cameras are used at Mary Scroggs as a supplementary tool for any use creative teachers have. Now, with the inclusion of VoiceThread, the video cameras have become very useful to capture many projects (see below).

Digital Cameras

Digital cameras are used to take photos and load them into VoiceThread for slide shows.

Digital Microscope

Students can use a digital microscope to record science work on VoiceThread (see below).

Teacher laptops

There was debate on the recent inclusion of teacher laptops. Teachers had fixed computers at their office desks and with the SMART Boards. Both the former principal and now former Tech Assistant reported: The principal at the time did not think the teachers needed them. The Tech Assistant felt from what he had gleaned from his Master's in Ed Tech and from how the teachers at Scroggs worked that they should have them. He convinced her and she reports this was a very wise decision for her to listen to him.

Teachers got laptops in approximately 2009. They take home their laptops and can at any time log in to the school/district server to access information they need to prepare work while not at school. Teachers can connect their laptops to the SMART Board.

iTouches and iTouch lab carts

Mary Scroggs has 3 iTouch labs (30 iTouches each, for a total of 90 iTouches). Students in Fourth and Fifth grade use iTouches actively. They can use them for quick reference like dictionary, to listen to publisher or teacher created podcasts or to use them to record their own audio projects. Generally, students record their own narratives, poems or essays on the iTouches and share them with other students in class. As to not waste class time, there is a 25-minute walking period for exercise and the Fourth and Fifth graders use this time to listen to shared work while walking on nature trails that surround the school. This program was highlighted in an article: http://www.mygazines.com/issue/8429/69

During my observation, I was taking a break at some lounge chairs located near the front door. A teacher who is not known as one of the higher integrators was taking his class out for a recess period/walk and each one had an iTouch around his/her neck with earphones in place. In a later email communication, he explained that it was Pearl Harbor Day and he had hoped to find a pod cast covering this event. He could not but settled for another similar topic.

A Fourth Grade teacher, a known high integrator amongst colleagues, creates his own podcasts and has students create their own podcast material to share on almost a

daily basis. This can be confirmed by viewing his lab schedule which requests podcasting tools almost every school day of the academic year.

Apple Laptop carts

Laptops carts are always in use at Mary Scroggs. During my site visit I saw them actively used by all grades, in particular the upper grades. Yet even the Kindergarten students were watching a media presentation created in person on-site at a recycling plant by the Media Specialist. She showed the students the video via the SMART Board located in the Media Center/Library. When it ended she, the Media Assistant, the Technical Assistant, the Kindergarten teacher and Aid, broke the class into 5 groups. Each group grabbed a laptop and the Media Specialist working here as a "co-teacher," did a quick demonstration of *Wordle*, which students had manipulated previously. (A *Wordle* is a free one-page presentation tool based on word clouds. It creates a random representation of a group of words, highlighting their importance by the size or characteristic of the font. See www.wordle.net). Each group made a *Wordle* based on what they had gleaned from the presentation. This was a dual immersion class so some groups did theirs in Spanish and some in English. About 10 minutes or less later, the Media Specialist quickly shot a few of them up to the Smart Board and showed the students' work to the group. The next day these *Wordles* would appear on the morning school-wide and parent broadcast of the "Ribbit News."

Now zoom to Fifth grade. This week Fifth graders in one class are using laptops to create jingles to "sell" and promote merchandise they have created for a school bazaar. The Technology Coordinator works 3 days in a row for about 50 minutes each as a "co-

teacher" with this group of students and the teacher. On the first day, the teacher and the Tech Coordinator present the concept and the tools. They demonstrate the use of the laptops and how the students will create the audio/visual jingles. (The Tech Coordinator is here, doing some one-to-one professional development with this teacher.) A few students begin to work a bit on the jingles while the other groups work on their ideas. For the next two days, the same thing will occur, although the technical directions will be briefer. She now knows that this teacher will be ready to do a similar project on her own soon. This teacher is considered a high integrator. The hope is that she informally collaborates with the other teachers at her grade level and possibly beyond.

Voice Thread

VoiceThread is fairly new to Mary Scroggs and is now the main shareware program in use. What is VoiceThread? It is a tool to create and present video, audio and slide show. It can also be interactive. The company website explains: http://voicethread.com/about/features/

> With VoiceThread, group conversations are collected and shared in one place from anywhere in the world. All with no software to install.
>
> A VoiceThread is a collaborative, multimedia slide show that holds images, documents, and videos and allows people to navigate slides and leave comments in 5 ways - using voice (with a mic or telephone), text, audio file, or video (via a webcam). Share a VoiceThread with friends, students, and colleagues for them to record comments too. Users can doodle while commenting, use multiple identities, and pick which comments are shown through moderation. VoiceThreads can even be embedded to show and receive comments on other websites and exported to MP3 players or DVDs to play as archival movies.

VoiceThread is very actively used at Mary Scroggs by students, teachers and staff to create technology-based projects and more so by support staff to show off the projects and events at the school that are not necessarily technology based. Grandparents can log in from other countries to see their grandchildren's art as posted on the school website. Work can be shared with kids from other countries. Parents can export what they see for offline use or to save.

VoiceThread (VT) replaces the need for various previously used software programs like iMovie, Audacity, iPhoto and the like and all without any software to install to existing computers. The school needs an account. All work can then be embedded into the school website and /or house on VT.

Any reference below to school web site can be seen at : www.chccs.k12.nc.us/scroggs/

- VT is now used to create the daily news student broadcast. The broadcasts are archived.
- VT is used to record each event that takes place at the school to post on the public website.
- VT is used to create movies to be used in classrooms like those in First grade. For example, kids are asked "What is kindness?" Then they act out "kindness" and it is recorded by VT and posted for later review.
- In science classes, kids can take the flip video cameras out to a puddle and record what is going on with insects or worms in the puddle. They can bring it back in, load it into VT and review it in class. It is archived for later use as well.

- In an art class, children create paintings or drawings. Their teacher or the Tech Coordinator (and at times the students themselves) then scans their art, make a slide show and add classical music, all using VT.
- Fifth graders have written their own fairy tales and have recorded the audio on to iTouches using VT.
- VT and flip cameras are used by the library to create "how to" videos covering topics like how to find a book using the Dewey Decimal System. See school web site.
- Bryan is a second grade student in ESL. So is Rhyo. Both are non-native speakers of English from Asia. In one class they (and all students) created their own adaptation of the book "Ms. Honey's Busy Day." They made a presentation with the teacher using clipart and recording their own log of daily activities in English. Their voices were recorded using their own sentences about their day. See school web site.
- Many grade levels are using ***Glogster*** software. (http://www.glogster.com/. Free to teachers.) This can be shown via VoiceThread. *Glogster* is a tool that allows users of all levels to create media projects much like a scrapbook. Kids use this to show information about themselves and their families. Third graders created biographies of famous people and inserted photos and textual information. They choose all the backgrounds and colors, font, styles, layouts, add clip art, etc. much like desktop publishing but it can stay online or be printed or emailed (To view this see "Ms. X's Class Uses *Glogster* for Biography Projects" on the school website.)

- The First graders did a *Glogster* about Toucans. See school web site.
- There is an insect project done by second graders using VoiceThread: One is about the mosquito. Mason is in a second grade classroom. He records his presentation in audio on Voice Thread and used PPT to show clip art and photographs of the mosquito and some information he details then this was uploaded into VoiceThread. Fred and Carter did theirs about the praying mantis. Each student did a presentation about an insect. See school web site.
- In Third and Fourth grade ESL, students were asked to create interview questions in English for other students. Then, the students sat down one-to-one and recorded interviews and answers in English. Then they created PPT clip art presentations to go along with their interviews and uploaded this into VoiceThread.
- The Fifth graders did Explorer Projects. Amanda, in one Fifth Grade class wrote an interview between the King of Spain, King Charles the Fifth, and the explorer, Franscisco Pizarro. See school web site. There is also a video narration by a support staff member of the projects the students did. See school web site.
- Students in another Second Grade class used a **digital microscope** to study the painted lady butterfly. See school web site.
- Every Fifth grader must come up with a unique project per the curriculum. Most choose to use technology and are now using VoiceThread. Students conceive of their project at home and in school, may work on it at home and also may get help at school.

School Website

www.chccs.k12.nc.us/scroggs/

The school website is a testament to the daily work of the Mary Scroggs school. This daily work with technology is easily corroborated with an on-site visit. It is loaded with projects that show student work (many of those listed in the previous section). Events at the school have been recorded by support staff including celebrations. Many projects shown on the school website are not student or teacher-generated but were recorded and shown by support staff.

Additionally, yet not for public access is a teacher home page. Each grade-level instructor has an up-to-date web page (some are dynamic some are static). Here, students and parents can find classroom specific items like homework.

Media Collection (Media Center)

Of course in addition to teacher-driven and student-driven hands-on projects, there are many resources available to teachers and students.

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