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This study explored school-wide technology integration at two sites where traditional barriers to technology were minimized. Traditional barriers include access to technology and support to integrate technology. A school-wide technology integration model was introduced at both sites ten years ago. Now, ten years later, what is being sustained? In particular, what were the stories of sustainability concerning school-wide technology integration. What afforded and constrained technology integration over the course of ten years?

Data were collected via interviews, observations, and document analysis at two sites within the same southern state over periods of five and four days. Participants were purposively sampled based on the number of years employed at each site. I interviewed faculty members who were present during initial implementation to the extent possible. Additionally I interviewed school-level administration and the media coordinator, regardless of number of years at the sites as they were key stakeholders within the model being implemented.

Looking at each site independently and then looking across sites yielded much information. The first site, Basking Elementary, was having a difficult time sustaining implementation. While there were literally signs stating the model was at the school, in practice it was much harder to see evidence. Faculty members interviewed spoke of difficulties implementing the model but also of the benefits of the model. At the second site, implementation was strong and had in fact

spread to other schools within the district. Teachers spoke of frustrations with the model, but integration was continuing.

Adequate funding is crucial as is professional development geared toward new faculty, including new leadership, and explaining the how and why of the model is important to sustain the work begun ten years ago. Teacher-buy in, generated by engaged leadership, and developing a cohesive school culture is also important to sustaining technology integration over time.

STORIES OF SUSTAINABILITY CONCERNING SCHOOL-WIDE TECHNOLOGY INTEGRATION

by

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Approved by

_____
Committee Chair

To my grandmother, Mary Roena Allison.

She taught me about faith, humility, strength, and lipstick.

Thank you.

APPROVAL PAGE

This dissertation, written by Mary Oliver Taylor, has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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CHAPTER I

INTRODUCTION

Technology is ubiquitous. It surrounds us in one form or another from the moment our alarm clocks go off to the moment we reset them before bed; therefore, it is inevitable that technology use would seep into our schools.

There has been much excitement and exploration concerning technology's usefulness for educating students since radio, film, and television first became commercially available (Cuban, 1986). Each successive technological innovation carried at least the implicit promise that education would be radically different after the innovation (Cuban, 1986). A tacit assumption was that each innovation would be embraced and utilized by education stakeholders. Some technology innovations gained permanence in one form or another inside the education landscape while others, like the use of radio, film, and television, faded away (Cuban, 1986, 2001).

The use of computer-based technologies in education is an example of a technological innovation embraced at different levels by stakeholders within education, as well as business and industry (e.g., The Partnership for 21st Century Skills). There was not much involvement with technology integration in education on a Federal level until the early 1990s, even though technology had been a part of education since the 1920s (Cuban, 1986). In 1994, then-President

Clinton signed the Goals 2000: Educate America Act, which led to the first national technology plan in 1996 (Wyzard, 2011). Also in 1994, data concerning internet connectivity in public schools in the United States became available from the National Center for Educational Statistics. After President Clinton's time in office (1993-2001), technology in education remained part of the federal education agenda. Title II, Part D of President G. W. Bush's No Child Left Behind (NCLB) Act, signed in 2002, dealt entirely with technology in education. The national technology plan was also rewritten in 2004 and was influenced by the NCLB Act (Wyzard, 2011). The national technology plan was again rewritten in 2010, during President Obama's administration. It appears that once the federal government of the United States took up educational technology as an initiative, it has not let it fall to the wayside. However, that is not to say that the integration of technology in schools across the United States, or even within states, is even.

Private businesses also began working with the government at various levels to facilitate technology integration (Cuban, 2001). For example, the Partnership for 21st Century Skills (P21) foundation, comprised of major corporations such as Dell, Ford Motor Company, and the Walt Disney Company, was created in 2002. The mission of the P21 organization is "To serve as a catalyst to position 21st century readiness at the center of US K12 education by building collaborative partnerships among education, business, community and government leaders" (Partnership for 21st Century Skills, 2011b, para. 1). To accomplish this mission, P21 developed a list of skills they saw as necessary for

“student success in the new global economy” (Partnership for 21st Century Skills, 2011a, para. 1), and created free materials for teachers to use in classrooms to teach these skills. P21 highlights how private sector businesses can collaborate to encourage technology use in schools, and highlights organizations outside of the federal government working to increase technology skills in public schools. However, without hardware, software, and connectivity in schools, it would be difficult to achieve any of governmental or private sector goals.

Technology available in public schools in the United States has increased since 1994, according to United States government reports. In 1994, 3% of instructional rooms had Internet access, while 35% of public schools had Internet access (Kleiner & Farris, 2002). An instructional room was any room used for instruction and included labs, computer labs, and library/media centers. By 2005, 98% of instructional rooms had Internet access (National Center for Education Statistics [NCES], 2012). In 1998, when the data was first recorded, the ratio of students to computers was 12.1 to 1 (NCES, 2012). By 2008, the ratio dropped to 3.1 to 1 (NCES, 2012). The increased presence of technology indicates that technology in schools is not a fad, but is becoming more and more a part of students’ every-day school lives.

However, there are two caveats to consider. One, the presence of technology in schools does not equate to the level of actual use (Cuban, 2001). Two, reports from the NCES do not report on how computers were used, only that they were located in schools and classrooms. For example, there is no

distinction as to how interactive whiteboards were used--either as an updated chalk board for teachers or as an interactive tool for students. These two caveats point to the need for a more nuanced examination of how technology is actually used in schools, and also to a need to identify barriers and facilitators for successful school reform when technology is one aspect.

In the early 1990s, a time when schools came under closer scrutiny and achievement gaps became headline news, technology in schools presented another possibility for improving education. Individual researchers (Collins, 1991; McCade, 1995; Mehlinger, 1996; Sheingold, 1991) examined technology integration as a catalyst for school-wide reform. The federal government commissioned two research reports. Of these reports, one (Means, Olson, & Singh, 1995) examined the possibilities of technology for school reform and the second (Means & Olson, 1995) was a case study of nine schools that were using technology to leverage school-wide reform.

The contributions of several individual researchers also shed light on the discussion surrounding technology's role in education reform in the 1990s (Collins, 1991; McCade, 1996; Mehlinger , 1996; Sheingold, 1991). For example, Collins (1991) predicted that schools would make increasing use of technology because the world outside of schools was becoming more reliant on computers to make work more efficient, and he predicted that eventually technology in schools "will take on a life of its own" (p. 33). Collins's perspective on school reform was examining how schools could be redesigned to "speed up the

adoption of any change that improves educational practice, whether involving computers or not" (p. 33). One of Collins's suggestions for making schools more compatible with changing society was to "start using computers as tools as much as possible" (p. 35). Sheingold (1991) was also interested in how to bring about change sooner rather than later, and stated that three forces must come into play in order to bring about school reform: (1) restructuring schools to bring about change, (2) active learning, and (3) technology use in an integrated fashion. McCade (1996) issued a call to action for technology educators, urging them to get involved in school reform efforts. Mehlinger (1996) ended his article by discussing why technology as a reform effort will likely *not* fail as other reform efforts: (1) this effort is "driven by teachers rather than outside experts", (2) by and large, there is no mandate for teachers to use technology in their classrooms in "prescribed ways," (3) parents and students want technology in schools, and (4) teachers eventually feel "pleased to have learned a new skill, and they gradually change the way they teach" (p. 407). All of these articles asserted that technology integration would and should play a role is school-wide reform efforts.

All but the Mehlinger (1996) article were published in Phi Delta Kappan, which is widely read by educators at all levels. For five years, this peer-reviewed journal dedicated space to the topic of technology's role in school reform. While the authors' had a shared vision to some extent, their discussions took different perspectives. However, these articles were not based on empirical research. Rather, they were focused on analysis, interpretation, and opinion. The result

was that a wide range of theories emerged regarding technology's role in school reform.

It was difficult to find actual research studies of schools using technology integration as a reform tool during this same period, despite the ongoing conversation of the potential of technology in schools. One exception, the report *Technology's Role in Education Reform: Findings from a National Study of Innovating Schools* (Means & Olson, 1995), utilized case-studies to examine nine sites: eight schools and one network of schools. These sites were already using technology in student-centered ways and the researchers "gave priority to sites that emphasized education reform (rather than technology for its own sake) and that provided challenging, authentic activities for students from economically disadvantaged backgrounds" (p. 1). The purpose of this research was to explore how technology might support constructivist learning in classrooms as well as explore what "practical and organizational factors" afford and constrain technology use in schools (p. 35). Of the school-level implementation questions, seven out of nine questions were couched in terms of reform efforts, not solely focused on the use of technology. The report seemed like a next-step toward studying technology's role in school reform because there was evidence that technology and school reform could work hand-in-glove to bring about increased student learning.

Also in 1995, a series of papers were contracted by the Office of Technology Assessment (OTA). In *Education and Technology: Future Visions*

(U.S. Congress Office of Technology Assessment, 1995), the authors were asked to forecast the trajectory of educational technology over the next five to ten years. When the papers were completed, the authors came together and discussed their work, creating a summary of each work as well as a written summary of the workshop. Not surprising, given the research literature, the possibility of technology to help schools transform was a common theme among the papers. Again, the emphasis was not on using the technology in and of itself, but using technology integration, “as a means for encouraging and facilitating broader reforms” (p. 4). As such, technology was viewed as “an impetus for major transformation in the institution of schools” using “new tools for carrying out this transformation in ways not possible before” (p. 4). In seven years’ time, some of those visions would become reality with help from the federal government.

As noted earlier, the No Child Left Behind (NCLB) Act of 2002 included guidelines for technology in education. Specifically, The NCLB Act earmarked money for increasing technology use in schools through the creation of the Enhancing Education through Technology grant program (EETT). One goal of EETT was improving student achievement through the use of technology. An additional goal was developing technologically-literate students by the end of eighth grade (U.S. Department of Education, 2012). Schools that accepted federal funding were bound to participate in the EETT program and felt the push to integrate technology.

An example of how money budgeted through EETT programs reached schools in North Carolina is the IMPACT Model Schools grant. A request for proposals was issued to all 100 counties and eleven schools were chosen to participate in the initial round of funding in 2003. The goals of the IMPACT grant were primarily to increase academic achievement (goal of reform) and secondarily to produce technologically-literate students by the end of eighth grade, regardless of "the student's race, ethnicity, gender, family income, geographic location, or disability" (U.S. Department of Education, 2004b, Sec. 2402, b2a).

After the four-year funding period for the IMPACT grant concluded in 2007, all eleven schools were able to submit a request for continued funding to the North Carolina Department of Public Instruction. The requests were reviewed, and based on exemplary practices during the four years of the initial grant, four schools were awarded additional, "enhancement grants." These four schools continue to identify themselves as IMPACT Model schools, even though all funding from the grant ended in 2008 and budgets at federal, state, and local levels shrunk. As these schools enter their tenth year of using technology on a school-wide basis, they are rich sites for exploring stories of sustainability and understanding the affordances and constraints of sustained technology integration in these settings.

Of these four schools, two are the sites for this study about the sustainability of a reform-based, school-wide technology integration model.

However, my interest is not to determine what successful integration is, but to better understand what facilitates and what hinders the sustainability of technology use in schools when the first-order barriers of access to and support for technology integration are minimized.

Statement of Purpose

The purpose of this study is to investigate two stories of sustainability of school-wide technology integration, and to explore what hindered and what facilitated the sustained use of technology at two elementary schools where barriers of resources and access to resources was minimized due to IMPACT funding for eight years. Based on the research literature about school reform and technology integration, learning about the roles teacher beliefs and leadership play in implementing and sustaining technology as an aspect of school reform may act as windows to help in better understanding what facilitates and constrains school-wide technology integration. However, there may also be other factors that emerge during the study of these schools since receiving IMPACT grant funds for technology integration. Ultimately, understanding the affordances and constraints of sustained technology integration in these settings may help school, district, and state leaders prepare for new, school-wide technology integration initiatives, such as one-to-one laptop initiatives.

Research Questions

The overarching question for this research study is: What are IMPACT schools' stories of sustainability of technology integration when first-order

barriers of access, availability, and support are minimized? Specifically, what has afforded and constrained technology integration at IMPACT schools initially and over time?

Propositions and Conceptual Framework

Several propositions based on reviewing the research literature underlie this study and come together to create a conceptual framework for this study (see Figure 1). My first proposition is that leadership and teacher beliefs, among other factors, may afford and constrain technology integration efforts on a school-wide level. My second proposition is that these concepts (leadership and teacher beliefs) are nested and influence one another. They are further nested in both school and district contexts where school-wide technology integration has been facilitated by eight years of IMPACT grant funding that eliminated first-order barriers of access to technology. My third proposition is that when the affordances for school-wide technology integration are greater than the constraints, technology integration efforts will more likely be sustained over time. These propositions derived from the research literature guided this research.

I also propose that exploring the sustainability of school-wide technology integration is to explore layers of interactions among stakeholders. If the past is any indication, technology in education is here to stay, in one form or another. Exploring how to sustain technology use in situations where it was deemed beneficial for students may aid educators and policy makers in determining how to cultivate success.

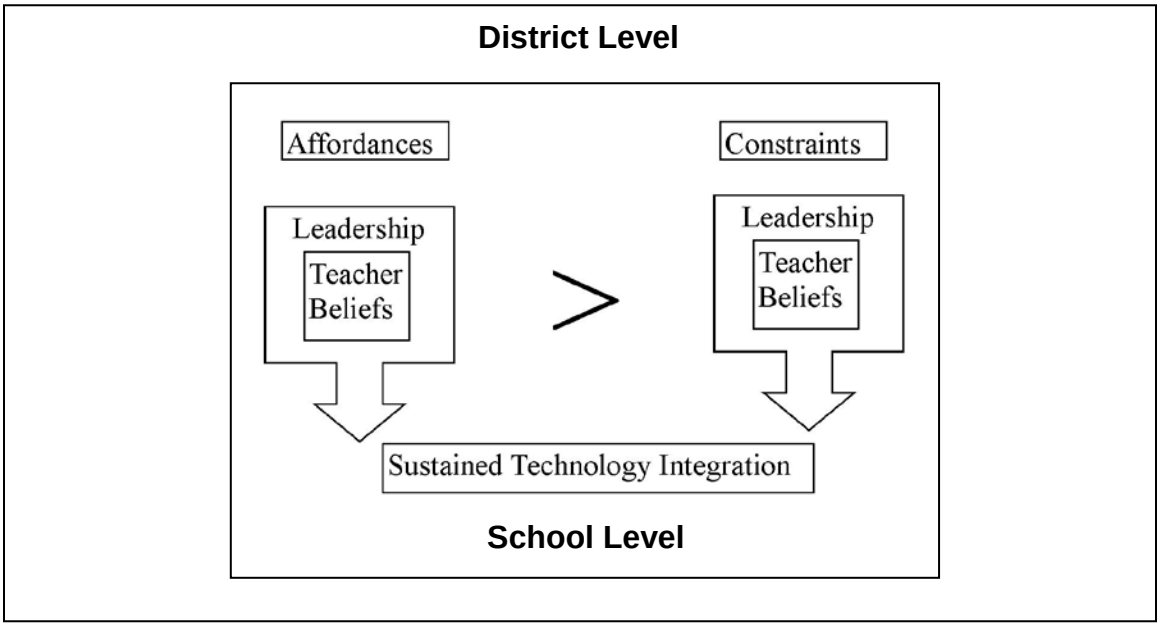

Figure 1. Conceptual framework.

Definitions

Exploring these concepts required that the following terms be defined as they are used in this study:

Leadership, Especially Distributed Leadership

As a qualifying condition for receiving funds from the IMPACT grant, each site formed a Media and Technology Advisory Committee (MTAC). This committee was responsible for making decisions concerning implementation of the IMPACT grant. The principal, media coordinator, technology facilitator, and technician were required to participate actively. The remaining participants were classroom teachers. For the purposes of this study, leadership refers to the MTAC committee at each site. According to Mayrowetz (2007), when work around distributed leadership began, the seed for the theory was more about

activity being distributed across “multiple people, and the tools they used would be helpful to understand the practice of leadership in schools” (p. 426). In order to clearly work within this new paradigm, “researchers must de-center, but not ignore, administrators to investigate leadership at the level of a school, rather than an individual” (Mayrowetz, 2007, p. 426). Considering Mayrowetz’s interpretations, the MTAC committee at each site embodied the principles of distributed leadership.

School-wide Technology Integration

The school is the unit of analysis for this study. School-wide technology integration (SWTI) was selected, rather than classroom-level analysis or a focus only on leadership, because of the nested, interacting, and reflexive nature of teacher beliefs, school culture, and leadership practices in schools. Additionally, the research has progressed to the school level. Cuban and Ertmer's work examined technology use in classrooms. The Apple Classroom of Tomorrow program initiated research at the classroom level. When policy makers and administrators began to embrace school-wide reform efforts, a school-wide focus on technology integration seemed part of a natural progression.

Teacher Beliefs

Teachers hold “beliefs about” specific areas or topics concerning their practice. Teacher beliefs can also be the outcome of how teachers evaluate aspects of their practice as well as their determination of the “truth or falsity of a proposition” (Pajares, 1992, p. 316). “Beliefs must be inferred” from what

teachers intend to say and do and how teachers respond to problems (Pajares, 1992, p. 315).

Technology Integration

In this study I use a 2005 definition from the International Society for Technology in Education (ISTE). In ISTE's definition, technology integration occurs when students select what technology tools are necessary "to obtain information in a timely manner, analyze and synthesize the information, and present it professionally." Those actions are considered "effective integration" (n.p. 2005). I selected this definition because of learning and the implicit belief that teachers and school leaders are perceptive enough about technology to present optimal tools from which students may choose.

Significance

This study will explore the stories of sustainability when well-documented barriers to technology have been minimized. When the IMPACT grants were originally implemented, school-wide technology use was scarce. Over the past ten years there have been more and more technology initiatives in schools, particularly one-to-one initiatives. While one-to-one initiatives may not be implemented school-wide initially, entire classrooms and grade-levels are deploying one-to-one initiatives. The point being technology use is moving beyond single classroom or single computer lab settings to multiple users simultaneously. From this perspective, IMPACT schools may offer insights about how to sustain such shifts in technology integration as they experienced such a

transition ten years ago. Additionally, IMPACT schools may offer insights into how leadership, school culture, and teacher beliefs afford and constrain technology integration. The minimized barriers created a unique situation ten years ago, but one that may be more commonplace now. What were the experiences of these schools that might inform implementation and sustainability efforts now?

Summary

As technology continues to be a part of our educational landscapes, educators, educational leaders, and policy makers continue to grapple with how to implement technology to enhance teaching and learning. Exploring teacher beliefs, school culture, leadership and technology integration will develop the context for examining school-wide use of technology. Examining two schools' journeys with technology integration via case studies may help shape work to implement and sustain technology and enhance teaching and learning.

It seems as if technology use in schools, at some level, is a foregone conclusion, but how integration plays out in schools warrants further study because of the influence of enduring issues about beliefs, culture, and leadership, and their roles as facilitators or barriers to integration. Therefore, what follows in Chapter II is a review of the literature related to the issues. Following that, Chapter III lays out the used methodology and methods during this study. Chapter IV includes case studies of the two selected schools and a cross-case analysis. Finally, Chapter V includes a summary and my

interpretation of these two cases as related to the literature on sustainability of models such as the IMPACT model, implications, and ideas for future research.

CHAPTER II

REVIEW OF THE LITERATURE

Background

In 2002, the Federal Government announced the passage of the No Child Left Behind (NCLB) Act. Then President G. W. Bush stated, “These reforms express my deep belief in our public schools and their mission to build the mind and character of every child, from every background, in every part of America” (U.S. Department of Education, 2002, para. 1). His Secretary of Education, Mr. Rod Paige, stated, “Our commitment to you [parents], and to all Americans, is to see every child in America—regardless of ethnicity, income, or background—achieve high standards” (2003). These quotes highlighted the stated purpose of the NCLB Act: academic achievement for every child in America. Examination of the NCLB Act revealed the plan for reaching that goal.

The NCLB Act was built on four “pillars:” “stronger accountability for results,” more freedom for states and communities,” “proven education methods,” and, “more choices for parents” (U.S. Department of Education, 2001). All the pillars except, “more freedom for states and communities” delineated steps for change and improvement in schools. Several changes followed, including standardization of assessments for comparison across districts and states. Every teacher had to meet the definition of “highly qualified” to retain his or her teaching

position. School and district report cards were mandated as informational tools for parents. If a school did not meet yearly benchmarks for several years in a row, schools had to offer tutoring, and parents would be able to send their children to a different school at the monetary expense of the school that was performing poorly. Low-performing schools were given additional financial support and funds for professional development to assist comprehensive school reform. The pillar concerning more freedom for states and communities resulted in more discretion concerning federal education funds (U.S. Department of Education, 2001). The price of this flexibility increased accountability (U.S. Department of Education, 2001), and led to innovative programs. Under NCLB, for example, it became possible to transfer funds among federal formula grants without separate approval. This portion of the NCLB Act also created other grant programs to enhance technology integration at the elementary, secondary, and post-secondary levels. In North Carolina, the Enhancing Education Through Technology grant program (EETT), from which IMPACT grants emerged, was developed under this pillar.

The schools in North Carolina receiving IMPACT grants were expected to experience systemic change. As a condition for accepting the award, the entire school was expected to complete professional development in several areas during each year of the funding cycle to facilitate positive change as schools revamped their approaches to teaching and learning. More specifically, schools awarded an IMPACT grant were re-visioned to emphasize the media center and

technology integration. Collaboration among grade level teams, the media coordinator, and a technology facilitator was facilitated by professional development. Professional development concerning technology began with "how to" and then shifted to how to meaningfully integrate not only software, but different hardware such as digital cameras, interactive whiteboards, and document cameras. Figure 2 represents the factors involved in implementing the model.

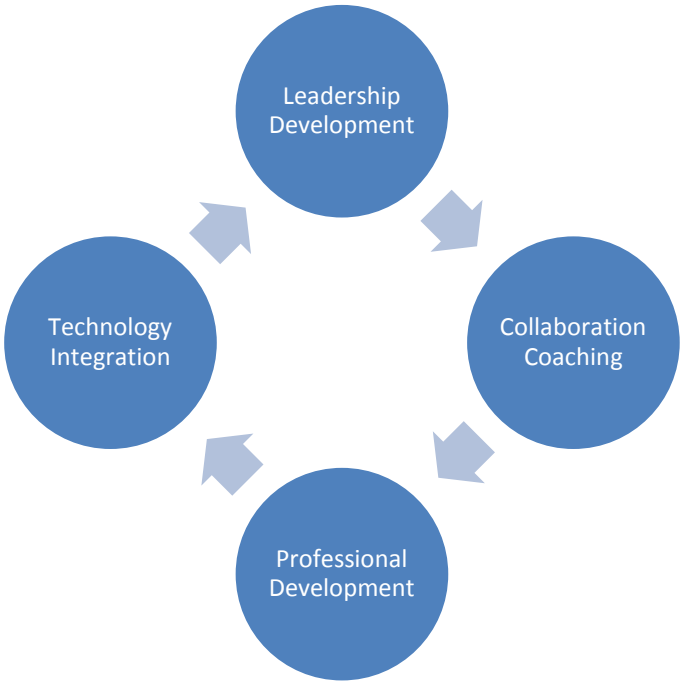

Figure 2. Components of model implemented.

And yet, schools are networks of individual people working together, so systemic change is intertwined with individual change. Due to the systemic nature of the award and the systemic, networked nature of education, and a

funding cycle lasting for multiple years, several areas in the research literature are related to what influenced the sustainability of changes in schools that received IMPACT grants. These include school culture, teacher beliefs, and sustainability.

School Culture

Although a definition of school culture was provided in Chapter I, I arrived at that definition by examining what was involved in the concept of school culture in the research literature since the 1970s. Goetz and Hansen (1974) examined four different theoretical perspectives on culture that researchers could assume when taking an anthropological approach to education research: Functionalism, Symbolic Interactionism, Ethnoscience, and Cultural ecology. Once each perspective was defined and analyzed, the authors outlined what a study of a school would look like within each theoretical perspective on culture. For example, Functionalists would "view the school as a self-contained cultural unit" and could choose either the classroom or the school as the unit of analysis. The main concern with either unit of analysis would be "what behaviors, expectations, and conditions must be met if the system is to survive?" (Goetz & Hansen, 1974, p. 5). Researchers would look for "standardized behaviors and expectations, expressed as norms, roles, and values" (p. 6) to determine what was necessary for the survival of the system.

Goetz and Hansen (1974) clearly related how different theoretical perspectives within anthropology could structure the study of culture within

schools. They did not point out possible weaknesses to consider within each perspective, but instead focused on the situations in which a particular approach would be well-suited, or not, to structure research. For example, of the cultural ecology perspective, Goetz and Hansen (1974) stated that it would be “fruitful in generating explanations concerning the behaviors of individuals, but the lack of examples” of this approach for studying school culture, “may be testimony to the difficulty with which it is applied” (p. 7). After similar exploration of each perspective, the authors concluded that, “In practice, it is likely that any given researcher will employ a combination of approaches” (p. 7). This acknowledgment brought theory a little closer to reality. Goetz and Hansen (1974) acknowledged the differences between the perspectives, at times, were subtle and there may be some crossover in perspectives at different phases of the research process. This statement also acknowledged that when a qualitative researcher took up a theoretical stance, it was not a guarantee that contextual factors would not require that perspective to adjust to *in situ* conditions. In light of the fading away of symbolic interactionism and functionalism in the research literature by the late 1980s (Avison & Myers, 1995), perhaps their acknowledgement also demonstrated their awareness that the study of school culture was a still-developing field in the 1970s.

The next turn in school culture research came when research conducted in schools was compared to research on organizational culture conducted in corporate settings (Dr. Coble, personal communication). It was at this time that

Deal and Kennedy (1983) and Peterson and Deal (1988) began writing about school culture. In their opening sentence, Deal and Kennedy (1983) stated, “We think schools can learn some lessons about productivity from the corporate world” (p. 14). Within the next two sentences they made clear they were not focusing on or perpetuating a “preoccupation with the bottom line” but rather a, “way to approach performance”—via culture (p. 14). Although the definition of culture they offered was under the heading “organizational culture,” in 1983, school culture was defined as “an informal understanding of the ‘way we do things around here’” (Deal & Kennedy, 1983, p. 14). Deal and Kennedy (1983) listed elements of school culture that included: “shared values and beliefs, heroes and heroines, rituals and ceremonies, and an informal network of priests and priestesses, storytellers and spies” (p. 14). Of this list, shared values and beliefs seemed logical, and rituals and ceremonies, when viewed as social occasions to reinforce values and beliefs, did not seem out of place in an educational landscape. But what about the remaining factors in Deal and Kennedy’s (1983) list? Priests and priestesses “worry about the values, storytellers whose stories carry the values and reinforce the heroes and heroines, and spies and gossips who remind everyone that organizations are human” (p. 15). These players who transmitted school culture carried different names than commonly found in the school culture literature, but served to reinforce the understanding that school culture was made up of shared values and beliefs and transmitted by people through roles that they assumed within the

school. Van Houtte and Van Maele (2011) explained that by the late 1980s, “school research discovered the culture concept which became one of the more prominent expressions to point to the character of the school” (p. 507).

In 1998, “school culture” was redefined as “the underground stream of norms, values, beliefs, traditions, and rituals that has built up over time as people work together, solve problems, and confront challenges” (Peterson & Deal, 1998, p. 28), as well as we as, “informal expectations and values” (Peterson & Deal, 1998). Peterson and Deal (1998) also developed a list of the characteristics of “strong, positive” school cultures (p. 29). The elements are as follows: “shared sense of purpose;” “underlying norms are of collegiality, improvement, and hard work;” students, teachers, and parents were celebrated for their hard work; a “social web of information, support and history” existed among all stakeholders; and “success, joy and humor abound” (p. 29). It is interesting to note how the language was more subtle concerning the roles of individuals in favor of “people” working together over time. In the intervening years the term organizational culture was dropped and the elements contributing to school culture broadened.

In 2005 Geijsel and Meijers reviewed the progression of research concerning the intersection of school leaders, organizational structures, and culture within schools as these facets related to the process of educational change. Their conclusion was that “current literature . . . is focusing on sustained educational innovation as a social construction of new practices within the professional community” (Geijsel & Meijers, 2005, p. 420). Innovations (such as

technology integration) were brought about socially, not in isolation. Geijsel and Meijers (2005) stated it was not mandatory to uncover exactly what conditions existed under which circumstances, “which conditions matter under what circumstances, but rather understanding how teachers, school leaders, teams, and schools as a whole learn by creating conditions and benefiting from them” (p. 422). Since the 1990’s researchers studied the process of creating conditions for innovation by exploring how knowledge developed as people worked together in particular socio-culture and social-cognitive situations (Geijsel & Meijers, 2005, p. 422). Further, Geijsel and Meijers (2005) explained when schools were viewed as professional learning communities there was the possibility that existing yet implicit knowledge residing within members of the learning community could be “more explicit and expanded” through “shared practices of research, reflection, dialogue, and the co-construction of meaning and skill” (p. 422). In other words, groups of people working together, sharing knowledge, could bring about change in schools.

Also during the 2000s, the conversation about culture shifted again to consider the concept of climate in addition to school culture (Schoen & Teddlie, 2008; Van Houtte, 2005). In 2002 Zhao, Pugh, Sheldon, and Byers defined school culture as “the dominate set of values, pedagogical beliefs, and practices of teachers and administrators in a school” (p. 496). Some in the research community felt that such a development was too inclusive. In fact, the two constructs were so intermingled that Van Houtte (2005) issued a “Plea for

Conceptual Clarity" between climate and culture when working in the field of educational research. However, citing Fullan from 2007, Waldron and McLeskey (2010) defined school culture as, "the guiding beliefs and expectations evident in the way a school operates" (p. 59).

In a review of literature on school culture, Roby (2010) cited five studies in which school culture was a major focus. Among these studies culture was described as having power to define groups, viewed as a tool, and having the potential to work for or against school improvement and student achievement. Although no definition of culture was stated by Roby (2010), the following words were used in a discussion of culture, "shared vision, values, goals, beliefs, and faith in school organizations" (p. 783).

In 2011, Van Houtte and Van Maele offered a succinct overview of how school climate differed from school culture. Climate, according to Van Houtte and Van Maele (2011), has four components, one of which was culture. Climate is organized around perceptions of each dimension while Culture is organized around "'a set a taken-for-granted assumptions, shared beliefs, meanings, and values that form a kind of backdrop for action"" (Van Houtte & Van Maele, p. 507, citing Smircich, 1985, p. 58).

The outcome of the critique of school culture was important for researchers. Now researchers had to distinguish between school climate and school culture within their own work and determine how best to measure the concept under study. In trying to determine which construct to use for study, Van

Houtte and Van Maele (2011), explained there are “problems with perceptual measurement” that plague the study of climate that made it difficult to link climate with well-defined structural or compositional features of schools. However, when working with school culture, the unit of analysis was underlying assumptions. Individual assumptions and beliefs could be bound together if they are demonstrated to be shared to a certain degree, and would therefore represent the culture of the organization (Van Houtte & Van Maele 2011). Even with the stipulation that with a degree of commonality beliefs and assumptions could be bound together, Van Houtte and Van Maele (2011) stated that because culture works with personal beliefs and not assumptions, it was possible to examine each of the four facets of culture. This was a strong endorsement for using school culture over school climate as a lens into the work of schools, making at least one decision in the study of school culture easier for researchers.

Looking across the definitions chronologically, one theme emerged. School culture was about beliefs and values. Over time, however, types of beliefs expanded to include pedagogical beliefs and the work of the school became an explicit part of school culture discussions. Therefore, examinations of school culture should include exploration of beliefs as teachers work with students, each other, and other members of the school’s community, which will be discussed in more detail later in this chapter.

Teacher beliefs, inferred from actions as teachers work with stakeholders, were looked at in this study as a window for exploring how the school is

organized. In some instances, decisions that must be made traveled along a “chain of command.” In other instances leadership was “distributed” across many members of the organization, and the group strove for consensus. In this process, stakeholders may participate or be resistant to participation in either situation, giving clues about their beliefs about technology in the process. There are two ways to examine how a school is organized: First, by examining who the leaders are and how they work in the school, and second by the functions of organizational culture.

School Culture and School Leadership

From a personnel standpoint, principals, assistant principals, and teacher-leaders guide school improvement and act as the leadership of a school. This group of leaders sets the tone for work in schools (Peterson & Deal, 1998). Because a group of school leaders sets the tone for work in schools, they may also influence the change process. As culture is situated and transmitted in social situations, and may be organized around learning (Goetz & Hansen, 1974), these actors are in a unique position to influence, if not shape, a school’s culture as well.

Peterson and Deal (1998) explored the role of leaders in shaping school culture. The first point of note is they discussed “The Role of School Leaders”, plural, and include principals, teachers and parents as leaders (p. 30). Further, the work of tending to school culture was distributed. Peterson and Deal (1998) listed ways school leaders shaped culture, several of which related to definitions

of school culture. For example, Peterson and Deal's (1998) definition of school culture included values, beliefs and traditions, and rituals. Their list of ways to shape school culture suggest that leaders "communicate core values," and they "observe rituals and traditions" (p. 30).

Roby (2010) reached the same conclusion, that leaders, in this case teacher-leaders, "can take the lead in bringing about change to enhance school culture" (p. 788). Implicit in Roby's discussion was that teacher-leaders should help schools shape the culture. Roby's work serves as a bridge to discuss not only the role of leaders in establishing culture, but how leaders can alter culture as well.

The actions of a school leader as a determining factor in the process of change was echoed in articles by Tondeur, Devos, Van Houtte, van Braak, and Valcke (2009), Kruger, Witziers, Sleegers (2007), and Ertmer and Ottenbreit-Leftwich (2010). Schrum and Levin (2009) also explored the role of leadership in the process of integrating technology and determined that leadership was one of the keys to successful implementation of technology during school reform efforts. Schoen and Teddlie (2008) also discussed the role of leadership but did not specifically mention the principal, reinforcing the idea that leadership does not have to be restricted to one person within a school.

In this study, understanding how school leaders shaped school culture in general, and how school leaders received innovations such as educational technology in particular, provided a deeper understanding of how innovations

were taken up or abandoned as a school-wide innovation. School leaders in this study played a pivotal role in facilitating change within their school.

School Culture and Technology Integration

As implied in the previous section, school culture is multi-faceted and may be a positive or negative force for integrating technology. Second, there are multiple points of intersection of school culture with the study of technology integration. Of particular interest in this literature review were the aspects of school culture that could be used to explore technology use as an innovation in education as well as how the innovation was taken up, or not, across different sites. Educational technology is an example of an innovation in schools that could benefit from addressing facets of school culture. The conception of tools and their use by individuals and by the larger social group(s) to which individuals belong is also a concept borrowed from the study of school culture. For some players viewing technology as a tool may have acted as a facilitator for integration. As tool use was related to the concept of culture (Cole, 2010), viewing technology as a tool allowed researchers in these studies to use the concepts of culture and school culture as hermeneutical tools. For example, Wozney, Venkatesh, and Abrami (2006) explained that teachers must first see the value of technology as a tool before they will attempt integration. Levin and Wadmany (2008) revealed that even if a teacher does view technology as a tool, it was possible to develop a change in perception, which would increase technology integration. Specifically, Levin and Wadmany (2008) worked with a

teacher who moved from seeing technology as a tool for teacher use to a viewing technology as a tool for student learning. This shift in perspective connects to ISTE's 2002 definition of technology integration as "the infusion of technology as a tool to enhance learning" that was "as accessible as all other classroom tools" (Overbaugh & Lu, 2008, p. 44). Shortly after the publication of ISTE's 2002 definition, Ertmer (2005) suggested that using technology as a tool be taken into consideration by teachers as a way to improve teaching and learning. By 2010, Ertmer and Ottenbreit-Leftwich (2010) believed that it should be an expectation on the part of principals that technology be used as a tool. From Ertmer's work in 2005 to her work in 2010, one constant was technology being used as a tool in schools. What changed was viewing technology tool use as a suggested strategy to improve learning to an *expectation* for teachers.

Another perspective on technology as a tool is how individuals take up the use of technology, or do not. Adoption and implementation is not only linked to the beliefs of the individual (Ertmer, 2005; Levin & Wadmany, 2008) but also to the norms and values at work in the larger context in which the individuals work—the school (Ertmer & Ottenbreit-Leftwich, 2010). Examining the school as the unit of analysis leads to a conclusion that "in the end, improvement is always about the learning of those involved" (Geijsel & Meijers, 2005, p. 422). Because school improvement is about individuals learning, the change process is situated within specific contexts and involves collaboration. Additionally, the socio-cultural or socio-cognitive aspect of the change process implies that the people involved

are working together and in the process are passing on values and beliefs, and re/creating knowledge. Investigating the situated nature of the change process in a school could result in case studies of how technological tools are adopted or marginalized by individuals and the school, to what extent technological tools are adopted, and exploration of beliefs that exist around the use of technology in schools.

Culture has been discussed in the literature as a barrier (Cresswell & Plano Clark, 2011; Ertmer & Ottenbreit-Leftwich, 2010; Hew & Brush, 2007) as well as a facilitator (Williams, Atkinson, Cate, & O'Hair, 2008). Ertmer and Ottenbreit-Leftwich (2010) found “culture pressure” that operated much like peer pressure was a force that could work for or against integration at the subject or school level (p. 267). Williams, Atkinson, Cate, and O’Hair (2008) provided an example of positive culture pressure. The authors described a statewide program designed to help school leaders transform their schools to make better use of technology. The authors explained collaborative culture facilitates and sustains change (Williams et al., 2008). Relatedly, Kopcha (2010) created a framework for integrating technology based on mentoring. He included culture at every stage of the integration process, and stated different aspects of culture are to be negotiated by the novice with the help of a mentor. These areas included modeling technology use, working in small communities of practice, and preparing the mentee to become a mentor (Kopcha, 2010). Roberson (2011) also made a simple charge connecting technology and school culture when stating

that teachers can either embrace the default culture that is currently at work in schools or embrace a culture of possibility. The culture of possibility involved using technology to better prepare students for their future. Each of these articles, while not directly examining culture as part of a study, recognized and discussed the role of culture in technology integration.

There were several additional studies that implicitly investigated the role of culture in technology integration. One study only used the word culture in the introduction and conclusion and did not provide any discussion of what role culture played in integration, only that it changed in the process (Lowther, Inan, Strahl, & Ross, 2008). On the other hand, Hadjithoma and Karagiorgi (2009) examined how an innovative culture, started by the principal led to school-wide implementation of technology. Shapley, Sheehan, Maloney and Caranikas-Walker (2010) also discovered that an innovative culture and principal leadership were key to integration.

Additionally, Tondeur et al., (2009) provided a connection between the study of technology integration and school culture by examining structural and cultural school characteristics. The roots of this study may be traced back to Van Houtte's (2005) statement that,

> since culture can be so easily connected with structural and compositional school features on the one hand, and with the behavior of individual members of the organization on the other hand, it becomes the most obvious mediating variable to explain the effect of school features on the behavior of members of the organization. (p. 82)

Both Demetriadis et al. (2003) and Tondeur et al. (2009) examined technology integration from a school-level perspective, not a classroom level and used examination of school culture as a means to explore that practice, which is consistent with the unit of analysis for this study—the school rather than individuals. Tondeur et al. (2009) found that schools with a clear understanding of their "strategic directions" and "an innovative culture" were more likely to understand what subsequent changes needed to occur to facilitate technology integration (p. 232). Additionally Tondeur et al. (2009) found that "cultural characteristics influence structural characteristics which, in turn influence again cultural characteristics" (p. 232). Cultural characteristics were defined much as school culture was defined, as shared norms, values, and beliefs (Tondeur et al., 2009). Structural characteristics included policies, plans, professional development, and "support to guide changes and continuous quality control" (p. 226). These structural characteristics could be heavily influenced by the leadership of schools, providing another intersection between school culture and technology integration.

School Culture, Technology Integration, and Leadership

Yet another intersection between school culture and technology integration is the role of leadership. Leadership, whether residing in a principal or distributed across several individuals, could play a role in facilitating change from less to more technology integration. In instances of school-wide technology integration that were deemed successful, leadership played a key role in setting

and communicating expectations (Peterson & Deal, 1998; Schrum & Levin, 2009) working with others (Baylor & Ritchie, 2002; Hadjithoma & Karagiorgi, 2009; Schrum & Levin, 2009), and providing support for change (Baylor & Ritchie, 2002; Hadjithoma & Karagiorgi, 2009). The role of the superintendent in the process of technology integration also highlighted these same characteristics. For example, Shuldman (2004) found the following attributes of superintendents working to implement technology in their district:

> [They] exhibited personal involvement, risk taking that required using the power of the superintendency to restructure the organization, reconfigured old positions and hired and defined new positions and programs to realize a vision, articulation of that vision, and commitment to it through shared decision-making opportunities, the building of community and school board support, and the expectation of engagement and active leadership by building principals to help implement the innovation and vision. (p. 337)

Note the commonality between the role of leadership in technology integration and the role of leadership in establishing and maintaining a school culture. The roles of leadership discussed in the context of school culture (Peterson & Deal, 1998) are astoundingly similar to the role of leadership in the context of technology integration (Roby, 2010; Schrum & Levin, 2009). Understanding how similarly leadership functions, while maintaining school culture and while trying to bring innovations into a school, is helpful for analysis and interpretation of technology integration studies. The role of leadership as a change agent and as a communicator of beliefs, values, and traditions related back to the social transmission and situated nature of culture. School culture

provided a framework for understanding the process of change toward technology use in schools.

Culture, School Culture, and Technology Integration

There are several components of culture in general that manifest themselves in the study of technology integration. Conceptualizing technology as a tool is one example, so conceptualizing technology use as tool use is yet another way to explore how technology use gets taken up or abandoned in different settings.

The social transmission of values and beliefs through mentoring relationships, professional learning communities, or professional development sessions are another connection between culture, school culture and technology integration. Working in groups to solve problems or engage challenges is one avenue of cultural transmission. When such groups were organized around integrating technology in meaningful ways, these groups may also perpetuate or resist existing culture (Cole, 2010; Glazer, Hannafin, & Song, 2005; Kopcha, 2008).

Another connection to the study of culture, school culture, and technology integration is the idea that culture is not stable and changes over time (Avison & Myers, 1995; Cole, 2010). Culture, including school culture, can be a positive or negative force (Peterson & Deal, 1998) and can be changed (Roberson, 2011; Roby, 2010). In some cases, this change was purposefully facilitated by school leaders (Peterson & Deal, 1998; Schrum & Levin, 2009). The importance of this

purposeful change was also pointed out by Ertmer and Ottenbreit-Leftwich (2010) who stated that it would be hard for teachers to innovate or integrate technology if their actions “deviated too greatly from existing values, beliefs, and practices of teacher and administrators in the schools” (p. 10). What was interesting about the Ertmer and Ottenbreit-Leftwich (2010) study was that while believing that “the underlying message here is that teachers’ knowledge and beliefs appear to interact with the existing culture to create action” (p. 13), they were analyzing the teacher rather than the organization in their article. Perhaps part of Ertmer’s legacy will be that she was focused on the whys of technology integration—what drives a teacher to change her practice.

Teacher Beliefs

The impact of teacher beliefs on teaching practice has been widely documented for many years. Nespor (1987) evaluated a Teacher Beliefs Study with findings directly relevant to what influenced impacts teachers to change their practice. First, Nespor (1987) found that beliefs frame classroom tasks, making beliefs a major determinant of teaching behavior and influencing how knowledge about tasks is organized. Ertmer (2005), discussing the work of Nespor (1987) and Pajares (1992), stated that beliefs are even stronger predictors of behavior than is their knowledge. Unfortunately, Nespor (1987) also stated that teacher beliefs may be formed prior to the time teachers are educated, and are therefore beyond the scope of teacher education programs. Research has also shown that “beliefs about teaching are well established by the time a student gets to college”

(Pajares, 1992, p. 322) and no matter how someone's beliefs may be assailed, beliefs will self-perpetuate.

However, all is not lost. Nespor (1987) did not see beliefs as unchangeable. He suggested that teachers might change their beliefs if they become reflective about their practice, aware of their beliefs about teaching, given or led to discover information about how well those beliefs serve them in the processes of teaching and learning, and helped to see alternatives. That is a long list of prerequisites that may or not result in a change in teacher beliefs, but the point is that teachers may change what they believe and it is not a fool's errand to attempt to change teacher's beliefs to some degree.

Pajares (1992) also found that teachers may not always be aware of the beliefs they hold, thus making it difficult to pinpoint beliefs. Also making it difficult to pinpoint beliefs is that they span multiple categories (Ertmer, 2005; Pajares, 1992). What made the study of beliefs relevant in this study was that beliefs frame classroom tasks (Nespor, 1987) including technology integration (Ertmer & Ottenbreit-Leftwich, 2010; John, 2005; Mueller, Wood, Willoughby, Ross, & Specht, 2008). To be clear, often, "teachers' attitudes about education" are "referred to as teachers' beliefs" (Pajares, 1992, p. 316). This was an "inappropriate" label as someone who is not a teacher may also hold the same attitudes (Pajares, 1992, p. 316). Additionally, someone who was a teacher most likely held beliefs about matters beyond teaching and learning. Therefore, it was "important to make the distinction" that what was under discussion here were

"teachers' educational beliefs" (Pajares, 1992, p. 316). This line of reasoning was what led Pajares (1992) to create six separate categories of "educational beliefs about" teacher efficacy, epistemological beliefs, beliefs about motivation, self-worth, subject-specific beliefs, and self-efficacy (Pajares, 1992, p. 316).

Types of Beliefs and Technology Integration

Change in integration practices may come about once teachers understand how technology can support the student-centered practices that bring about improved student learning outcomes (Ertmer & Ottenbreit-Leftwich, 2010; John, 2005; Mueller et al., 2008). Ertmer and Ottenbreit-Leftwich's (2010) final conclusion was that "we must focus our change efforts on helping teachers understand how student-centered practices, supported by technology, affect student learning outcomes" (p. 278), if we are to realize technology integration. These examples align with Pajares' (1992) first belief category about teachers' sense of efficacy about integrating technology into their classrooms.

Teacher self-efficacy beliefs also play a part in technology integration (Ertmer & Ottenbreit-Leftwich, 2010; Van Acker, van Buuren, Kreijns, & Vermeulen, 2010; Wozney et al., 2006). Self-efficacy, as Pajares (1992) defined it, is the confidence to perform specific tasks. Predictably, the more comfortable teachers feel using technology, the more often they will use technology in their classrooms. Ertmer and Ottenbreit-Leftwich (2010) found that seeing students succeed when they use technology also increased their self-efficacy. Earlier, Ertmer (2005) described a nexus of beliefs that influenced technology use. Self-

efficacy for teaching with technology was combined with beliefs about contextual factors that facilitated good teaching, and how likely teachers were to teach in such a context. In this study, self-efficacy is one factor in the technology integration process, although still influenced by context.

Related to the complex nature and interplay of teachers' beliefs about technology integration, Van Acker et al. (2010), analyzed the over 1,000 responses to their survey concerning teachers' intention to use technology in the classroom. For this study, the behavior under study was the use of technology in classrooms. After conducting statistical analyses, the variable that most strongly determined intention to use technology was self-efficacy (Van Acker et al., 2010). Bolstering self-efficacy was proficiency with technology (Van Acker et al., 2010). It would seem, according to this study, that confidence to use technology in the classroom came after proficiency, and therefore, intention was not based on only one variable.

In their study, Wozney et al. (2006) used expectancy-value theory to frame their investigation of technology integration. These researchers examined factors that included how teachers designed lessons, school culture, motivation, and contextual features. Contextual features included age, number of years of teaching, and if policies or strategies were in place to facilitate integration. Wozney et al. (2006) found that when encouraging teachers to integrate technology, teachers needed to believe that they could successfully use technology in their own context before teachers could use it with their students.

“Teachers who believe they have the skills to implement computers successfully and who valued the outcomes associated with integration” were likely to use technology more often in their classrooms (p. 195). These factors of expectancy of success “were the most predictive of computer use” (p. 195). Notice, too, that in this study it was not strictly efficacy beliefs, but also a belief that there are valuable outcomes of successful integration.

One category that Pajares (1992) included in his discussion of teacher beliefs that was not found extensively in the research was epistemological beliefs. Reviewing the literature about technology integration and teacher beliefs, I found one discussion of epistemological beliefs and technology use as well as one discussion of technology use within specific disciplines. These discussions were part of the same article by John (2005) who claimed that some disciplines may seem more suited for using technology like science and math, based in part on their empirical nature. John’s stance represented the convergence of epistemological beliefs and pedagogical beliefs. It is this convergence, along with context, that John (2005) studied when interviewing 37 secondary teachers at the conclusion of a four-year technology integration study. Participating teachers taught different subject areas, creating the opportunity to investigate possible differences in beliefs about the integration of technology within different academic disciplines. The framework John (2005) adopted was Bernstein’s identity work concerning sacred and profane aspects of identity formation. The sacred referred to relationship between specific types of knowledge and

subsequent behaviors or beliefs resulting from internalizing specific types of knowledge (John, 2005). The profane referred to forces that work against the sacred, such as context (John, 2005). Two additional features of this framework were, (a)“the levels of ‘insulation between the two categories’ (Bernstein, 1990, p. 23) but also (b) the socialization into subject loyalty which becomes ‘the lynch-pin of identity’” (John, 2005, p. 472). John’s (2005) unit of analysis was teacher perception about perceived use of technology and perceived impact of technology use on learning.

John’s (2005) findings were numerous. In order for teachers to engage in long-term use of technology in the classrooms, teachers had to see a connection between the content they were responsible for and the technology, as well as between the pedagogy and the learning outcomes. Indeed, for the teachers in John's study, their learning goals were the guiding factor in their decision to use technology. Discovering that learning goals guided decisions about using technology was one of the most salient findings because meeting learning goals “might eventually lead to greater transformation” in the use of technology (John, 2005, p. 486). In instances where technology use led to transformations of practice, teacher beliefs about knowledge changed. The transformation occurred when teachers moved away from a linear, “single context of learning” to “seeing knowledge creation as demanding higher order thinking skills and analysis that could only be achieved through the creative use of ICT” (John, 2005, p. 485).

In this study, John (2005) concluded that it is not subject matter that drives use, but learning goals, although subject matter was an additional filter through which to consider technology use. Further, as different subjects may use different pedagogies to reach learning goals, technology integration may be adopted at different rates in different subject areas, as teachers are more and less comfortable with technology's ability to address learning goals without taking away from the subject area "its scared elements" (John, 2005, p. 48). However, John also concluded that technology will more likely be adopted if it will facilitate learning, and it will be more likely to be transformative if teachers shift their beliefs about knowledge creation and about teaching practices (see also Keller & Bichelmeyer, 2004).

While not one of Pajares's (1992) belief categories, Ertmer (2005) made a case for considering pedagogical beliefs as a possible barrier to technology integration. She categorized three ways that teachers conceptualize technology use: as a teaching method, as a tool, or as a reform initiative. How the teacher conceptualized technology use frames their classroom use. For example, if technology was believed to be a teaching tool, it was more likely to be used as such in a classroom (Ertmer, 2005; Mueller, et al., 2008). On the other hand, if technology was seen as a reform initiative, it was viewed as just "one more thing to do" (Ertmer, 2005, pg. 30). Among teachers who do use technology in their classrooms, use, at least initially, may be in the service of what they are already doing (Cuban, 2001; Ertmer, 2005). Consider the example of direct instruction

and interactive whiteboards. Direct instruction is a teacher-centered practice. The use of interactive whiteboards was cited as reproducing the “sage on the stage” teaching that is so closely associated with heavy use of direct instruction (John, 2005). In such cases, the interactive whiteboard suits the teacher’s preferred mode of teacher-directed instruction and therefore requires little change in existing beliefs or practice to use in the classroom. However, Wozney et al. (2006) found teachers who had a student-centered approach were “more likely to integrate computer technologies more frequently” (p. 193). This was another example of technology use not challenging existing pedagogical beliefs, and therefore being integrated into classrooms perhaps more readily than by someone whose pedagogical beliefs are challenged by technology in the classroom. Alternatively, perhaps it was not that a student-centered philosophy facilitates more technology integration, but that technology integrates more easily into this teaching philosophy than others.

Relevant to this study, Pajares (1992) offered the following thought about teacher beliefs: “theorists generally agree that beliefs are created through a process of enculturation and social construction” (p. 316). Beliefs, in general, do not manifest themselves out of thin air, nor are they immune to the influence of people around us. Another important part of beliefs is understanding that “Beliefs may also become values, which house the evaluative, comparative, and judgmental functions of beliefs and replace predisposition with an imperative to action. Beliefs, attitudes, and values form an individual's belief system” (Pajares,

p. 314). This summation of several of Pajares' findings about beliefs raises several important points for my research. First, beliefs are more about judgments than attitudes. Second, beliefs are created by participating in existing cultures and working with others. This understanding makes the context of teacher practice within the school important to consider. Finally, if beliefs do become values, values contribute to school culture, making context important to consider when examining technology integration.

In sum, research tells us that each teacher brings to the classroom a set of beliefs that drive practice (Ertmer, 2005; Nespor, 1987; Pajares, 1992), and that beliefs are key to defining tasks and determining how to accomplish tasks (Ertmer, 2005; Nespor, 1987; Pajares, 1992). In addition to those basic beliefs, teachers are more likely to use technology that makes their time with students more productive and is easy to implement (Ertmer & Ottenbreit-Leftwich, 2010; John, 2005; Mueller et al., 2008). Under such conditions, classroom-level integration will likely remain uneven. There will be some educators who embrace technology and incorporate bleeding-edge applications while others in the same building will shy away from integration because they do not feel they are proficient enough with the technology themselves, or they do not see any value for their students in integrating technology (Ertmer & Ottenbreit-Leftwich 2010; Van Acker et al., 2010; Wozney et al., 2006).

Teacher beliefs are powerful, deeply ingrained facets of teacher practice. While either first- or second-order barriers may hinder integration, if beliefs make

technology integration difficult, teachers may be less willing to negotiate first-order (external) barriers and may not address second-order (internal) barriers to realize technology integration (Ertmer, 1999). Educational beliefs may include as many as eight categories with no assurance that teachers are aware of all the beliefs they hold. Furthermore, educational beliefs are intertwined with one another and shape daily practice in profound ways. As such, beliefs operate at both an individual level and a collective level. One aspect of a school's culture is beliefs held in common (Peterson & Deal, 1998). With so many avenues for teachers to express beliefs, as they work with students, parents, and colleagues, beliefs could be considered at the core of what drives practice, shapes the school's culture, and influences the process of change.

Implementation, Institutionalization, and Sustainability of School-wide Technology Integration

The IMPACT Model was deployed at a time in United States educational history of continued efforts at comprehensive school reform four years after our nation's first technology education plan was released (Wyzard, 2011). These two factors created a perfect storm, of sorts, for the development and implementation of the IMPACT model, itself considered a comprehensive school reform model (A. Overbay, personal communication, October 24, 2011). Much data had been published concerning comprehensive school reform efforts in general. However, as Datnow (2005) pointed out, it has been difficult to study reforms over time, "in part because most reforms do not last" (p. 123).

Examining the National Center for Education Statistics' (NCES) work with technology in education provided a window of understanding the progression of data about technology integration. Although NCES started collecting data in 1963, it was not until 1997 that NCES collected data about technology in education. It was not until the following year research was published exploring technology use in elementary grades specifically. Meanwhile, in a 1995 national study of innovative schools from the Stanford Research Institute (SRI International), prepared for the Office of Educational Research and Improvement (OERI), the chapter on sustainability was only two of the more than 180 pages in the report. By 2006, in a report by American Institutes for Research (AIR) in coordination with the United States Department of Education, the chapter on sustainability had grown to 17 of the more than 180 page report. While research concerning access to technology began to appear in the mid 1990's, the research questions developed over time to explore use of technology within classrooms, and eventually to explore sustainability. Comprehensive school reforms has remained a focus of research and as state and local school districts have continued to embrace technology in schools, more literature specifically discussing technology as a tool or platform for comprehensive school has become more available.

Complicating the study of sustainability is the lack of distinction between implementation and sustainability. Desimone (2002), while discussing consistency of implementation between comprehensive school reform and district

and state policy cited a study by Stringfield and Datnow from 2002 that sustainability required systemic support and consistent implementation. While making the case for involving district leadership during implementation, Desimone (2002) stated there was a consistent evidence that districts needed to support change efforts in order to sustain change in schools. Planning for sustainability was certainly advocated for in the literature. Unfortunately, discussing sustainability while also discussing implementation blurred the distinction between the two phases of reform.

Datnow focused on sustainability of comprehensive school reform (Datnow, 2005). In her review of literature, she made a connection between institutionalization and sustained implementation. Datnow concluded that a reform was institutionalized when it "becomes a taken-for-granted feature of life in a school" (p. 123), and typically involved "a multilevel process of embedding an innovation in the structure and norms of the organization" (p. 123). Datnow offered no such explanation of sustainability, other than a dictionary definition, but stated that the two concepts were "inextricably connected. For a reform to be sustained, it must become institutionalized. So to, when a reform is institutionalized, it has been sustained over time" (p. 123). Datnow indicated the two terms marked different phases of research, ascribing the term institutionalization to earlier research and sustainability to newer research.

Billig, Sherry, and Havelock (2005) discussed both sustainability and institutionalization in their study concerning technology integration. These

authors defined both terms by explaining how the terms differed. Institutionalization described a condition where the innovation "loses its own identity and becomes a normative part of the organization and its culture" while sustainability described a condition where the innovation "does not lose its identity; rather, it becomes valued and supported as part of the institution's culture" (p. 987). According to these definitions, there is a clear difference between institutionalization and sustainability, as opposed to Datnow's (2005) definitions that imply an interchangeableness. Maintaining a distinction between these two similar concepts is like maintaining a distinction between implementing and sustaining an innovation. While connected conceptually, each term should stand on its own to facilitate analysis and interpretation of data.

Datnow (2005) and Billig et al. (2005) had another commonality. Both studies discussed factors supporting sustainability of comprehensive reforms in their literature reviews. Datnow (2005) found that a school's ability to adapt, the interactions among how well the school's culture and those responsible for spearheading the reform worked together, the political climate, and how well the reform fit into daily practice increased sustainability. Billig et al. (2005) identified nine factors leading to sustainability, based on their own study of 17 organizations that "sustained educational innovation over a period of at least 10 years" (p. 988). The factors, in abbreviated form, are listed below:

1. Strong Leadership,
2. Strong Infrastructure and Organizational Development,

3. Support Structures,
4. Incentives to draw people to the system and encourage them to remain,
5. Visibility,
6. Credibility,
7. Strong, Mutually Beneficial Partnerships,
8. Macroculture Development, and
9. Sufficient Funds.

The outcome of the Billig et al. (2005) study was that not all these factors were necessary for sustainability. However, the researchers reached this conclusion after only one regional study.

While Hsu and Sharma's 2010 study concerning sustainability is more recent, and focused on technology integration, the framework discussed sustainability from a planning perspective and not from a post-implementation, on-the-ground perspective. It is vital to consider sustainability at the planning stages of innovation, examining recommendations may not offer the best evidence of "what works." However, Lawless and Pellegrino (2007) stated high-quality professional development was a strategy for sustaining technology integration. High-quality professional development was described in the research literature as long duration, putting new technologies in the hands of teachers, active engagement during professional development, collaboration among peers, and clear and "common vision for student achievement" (Lawless & Pellegrino, p.

579). However, Lawless and Pellegrino's study explored these descriptions and found little evidence to support the claims made about "high quality" professional development in technology integration. Further study of professional development's role in sustaining technology integration is warranted (Lawless & Pellegrino, 2007).

Conclusions from Review of Literature

There are a host of issues to consider when examining technology integration in schools. Many of these issues include issues like teacher beliefs, school culture, and the sustainability of school-wide reform. Recall Nespor's (1987) criteria for altering teacher beliefs: teachers might change their beliefs if they become reflective about their practice, aware of their beliefs about teaching, given or led to discover information about how well those beliefs serve them in the processes of teaching and learning, and helped to see alternatives. The last two, or half, of these changes cannot be accomplished alone. As beliefs are deeply personal, it is unlikely that a teacher would be open about beliefs without trusting coworkers. Therefore, if the school's culture is one that facilitates sharing and encourages collaboration, teachers may be more open to changing their beliefs concerning technology integration, for example.

Once the commitment to integrate technology is made, there are two choices when working to integrate technology. That is, obstacles can be worked through or worked around. Individual teachers may want to integrate technology into their classrooms and yet lack the resources necessary to work through or

work around numerous barriers. School-wide integration may facilitate more even and more equitable integration because the resources of the school, and perhaps of the district, are leveraged toward a common goal, or there may be additional barriers that need to be considered. School-wide integration may also lead to more consistent implementation and more savvy technology uses by teachers because a school-wide model asks every teacher in the school to integrate technology as part of belonging to and participating in that school's culture. However, we know that school culture can either influence teachers to adhere to school-wide expectations for technology integration or in turn influence the school culture of how technology integration actually occurs (Ertmer & Ottenbreit-Leftwich, 2010) or sustained over time. Therefore, what follows in the next chapter is a detailed description of how I propose to study school-wide technology integration in two schools that received IMPACT grants from the state of North Carolina. These grants were provided to schools with high need for resources and support in order to integrate technology school wide.

CHAPTER III

METHODS

The purpose of this study was to better understand who and what sustained a school-wide technology initiative unfolding over 10 years at two different sites. I was also interested in what afforded and constrained technology integration over time in settings where first-order barriers to technology integration were minimized (Ertmer, 2005).

Research Design

A constructivist approach informed the research. Constructivism, as explained by Creswell (2003), makes several assumptions about knowledge. Citing Crotty (1998) Creswell 2003) stated individuals use their own perspectives, created by their past and their present, to make sense of the world around them and, "the basic generation of meaning is always social" (p. 9). As such, meanings are "varied and multiple" (p. 8). The layered perspectives and multiple influences inherent in a constructivist approach make some demands on the researcher. Questions used with participants should include open-ended questions to allow participants to construct their own meaning in response (Creswell, 2003). Additionally, the researcher should recognize how his/her past and present influence the research process. The constructivist approach adopted for this research resulted in the selection of case study methodology.

A qualitative approach to this research question was adopted in part because of the way the IMPACT grant awarded to the schools was structured. While there were certain parameters that each school had to follow, such as hiring a technician, there were many other parameters left for each site to define. Therefore, contextual differences were guaranteed to exist from site to site. “Qualitative research is a situated activity that locates the observer in the world . . . hoping always to get a better understanding of the subject matter at hand” (Denzin & Lincoln, 2005, pp. 3–4). Being “situated,” the researcher is observing or participating in existing practices or phenomena, and not expecting one setting to be identical to the next. This philosophy matches the context of this study during which I observed successful practices in two different contexts (Schram, 2006). Also, the goal of my research was not to seek the cause of existing practice, but rather a deeper understanding of what is working and what is not as schools strive to integrate technology ten years after receiving an IMPACT grant. The “lived experiences” of the people who have done the successful work of technology integration (Denzin & Lincoln, 2005, p. 8) was also a focus. As such my work generated rich, thick description of the settings, people, and activities in each setting (Denzin & Lincoln, 2005). These are all hallmarks of qualitative research.

Another aspect of qualitative research that makes it an apt choice for this project is that my lived experiences have a role in the work I do. As Schram (2006) pointed out, making explicit that I have worked at an IMPACT school for

over ten years “serves to inform, not undermine . . . credibility” (p. 9). Acknowledging the researcher's lived experiences, biases, and limitations are also important because qualitative research is interpretive (Denzin & Lincoln, 2005; Schram, 2006). The interpretive nature of qualitative research is also what opens this type of research to criticism from researchers favoring quantitative methods.

Case studies are a good methodological choice when describing or explaining how something happened (Yin, 2006). Case studies facilitate a deep understanding of "a program" or "a process" and are "bounded by time and activity" (Stake, 1995, as cited in Creswell, 2003, p. 15). Shank (2006) referred to these types of cases as "particularistic" (p. 127). For this study, the unit of analysis was a single school and two schools were studied, resulting in two cases. For both cases, the program under study was the IMPACT Model. The process under study was the work of sustaining the model over ten years. Selecting two cases made it possible to engage in cross-case analysis to look for similarities and differences among stories of sustainability and therefore gain a deeper understanding of what afforded and constrained integration at two sites.

Employing case study methodology also aligned with the constructivist underpinnings of this research because case studies can be conducted on-site in the context of the program under study. Working on-site brings the researcher into the context rather than asking the researcher to utilized less contextualized quantitative data. Also, the triangulation of data sources mirrors the social

construction of knowledge by participants. Participants construct knowledge of the IMPACT Model in these cases through participation in the model and interactions with peers and administration. Triangulation serves the same function for the researcher. The researcher constructs knowledge of participants' shared meanings, observations, and document analysis by comparing multiple sources of data garnered from multiple participants at each site.

A structured approach (Maxwell, 2005) to methodology was adopted for this study for the sake of comparability across settings and participants (Maxwell, 2005). In sum, before collecting any data, I determined case study methodology was appropriate and developed a semi-structured interview protocol and determined what to observe during walk-through observations. Theory was used to guide case selection and generate start codes during data analysis, lending more structure to the methodology. What follows is a detailed description of how I structured my data collection and data analysis.

Case and Participant Selection

The cases were purposively selected. Cases for this study were selected on the basis of being “extreme” (Yin, 2006). That is, the case study sites for this research were selected from among eleven schools in North Carolina that participated in a school-wide technology integration grant called the IMPACT grant between 2001 and 2005. Of the 11 original schools, only four received the enhancement grants for four more years of funding at the conclusion of the funding period due to their progress with school-wide technology integration. The

continued funding based on successful implementation was one dimension of what makes these sites extreme. The state's Department of Public Instruction determined success based on self-reports from each of the eleven schools. Of the four schools, one was chosen for the pilot study, and I am employed at one site. Therefore I conducted research at the remaining two sites: Basking, a K-5 elementary school in eastern North Carolina, and Trevally, a K-2 primary school in eastern North Carolina (note all names are pseudonyms).

Participant selection at each site was also purposive. According to the implementation guidelines of the IMPACT grant, each school was to establish a Media and Technology Advisory Committee (MTAC). Membership was to be comprised of the principal, the media coordinator, the technology facilitator, the technician, and teacher representatives. Therefore, the principal, media coordinator, and technology facilitator were asked to participate due to their designation as MTAC members. Technicians were no longer on-site at either school and therefore not asked to participate. In addition to these participants, I asked teachers and instructional assistants who were teaching at the school at the time of implementation of the IMPACT grant to participate in the study. Table 1 shows the number and role of participants at each site.

Table 1. Number of Participants

Role of Participant	Basking	Trevally
Principal	1	1
Administrative Assistant	N/A	1
Media Coordinator	1	1
Technology Facilitator	1	0
Teacher	4	9
Instructional Assistant	5	0
Community Liaison	1	N/A
Total	13	12

Data Sources

The questions on the semi-structured interview protocol were the result of the review of the literature and careful analysis of my pilot study. For example, based on the review of the literature, I asked pilot study participants what was celebrated at their school. My goal with this question was to understand the culture of the school. However, during the pilot study it was revealed this question was confusing for participants. Therefore, I dropped the question from the study because I felt the degree to which I had to clarify the question tainted participant responses. See Appendix A for the Interview protocol.

In addition to individual interviews, I conducted focus groups at each site. I conducted a focus group with teachers and instructional assistants and a second focus group with administration. Due to scheduling, I was not able to complete the focus group with administrators at Trevally. A semi-structured protocol for the

focus group was designed based on the literature and analysis of my pilot study results. See Appendix B for the Focus Group protocol.

For the walk-through observations, I used a combination of items previously designed for IMPACT evaluators to observe classrooms and items from a principal-created walk-through protocol (Bushman, 2006). Based on the IMPACT protocols, I observed the number of computers/laptops in the classroom, the number of students interacting with technology in the classroom, if technology is used by individual students, small groups/pairs of students, or as whole-class instruction, and how the technology was being utilized. Based on Bushman (2006), I observed long enough to identify the objective of the lesson, the instructional methodology used, the level of mental engagement required of the students, and the evidence of instructional support on the classroom walls (p. 59).

Combining these two sources, I was able to make consistent, focused observations in classrooms. I completed twelve walk-through observations at Basking and eight at Trevally. I was also able to observe two grade-level meetings at Trevally, and a professional development session at Basking. See Appendix C for the Walk-through Observation protocol.

Data Collection Procedures

Data collection for both sites proceeded as follows: After obtaining permission to visit each site from the principal, I arrived on Monday morning before the school day officially started. I met the principal who introduced me to

faculty and designated a work area for me. I began scheduling interviews and conducting observations. When I had completed individual interviews with all participants, I scheduled focus groups. Prior to talking with or observing any individual, I asked for each participant's informed consent. Interviews and focus groups took place during teachers' planning periods or after school. The average length of the individual interviews and the focus groups was forty-five minutes. Interviews and focus groups were audiotaped, in all but one case. In the one exception, the individual participant provided a typed response to the questions at the conclusion of our interview. I also took field notes during and after the interviews and focus group. The average length of classroom walk-through observations was ten minutes. Field notes were completed during observations as well. At the conclusion of each day, I made additional notes. When possible, I observed in the classrooms of teachers whom I interviewed, in addition to other classrooms. I chose to observe in random classrooms to better understand the degree to which the model was still being implemented. I collected data at Basking for five days and at Trevally for four days.

At both sites, my visit was not announced to the faculty until I arrived at the site. Not announcing my visit prior to my arrival minimized the degree to which participants could present elaborate lessons or try to show me what they thought I wanted to see. However, it also created a bit of unease among faculty members. The unease seemed more pronounced at Basking. To alleviate some of the unease at Basking, I sought ways to participate in the activities of the

school. For example, I helped prepare for two programs being hosted by Basking for the community,. I also attended a parent information session hosted by Basking. Trevally did not present such opportunities at the time of my visit.

While at both sites, I sought access to school improvement plans and local technology plans. Both of these documents were available on the school or district websites. I also utilized publicly available data about standardized test scores from 2001-2012 from the state's department of public instruction. These documents were analyzed using the coding schemes discussed in the next section. Document analysis occurred after interviews had been transcribed and coded. Figure 3 is a timeline of procedures.

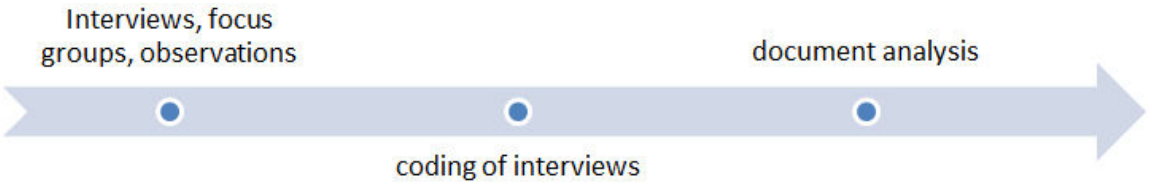

Figure 3. Timeline for data analysis.

Data Analysis

Once interviews were transcribed, I began the process of coding the data. Codes are tags assigned to meaningful chunks of data. I took a hybrid approach to coding by generating a few codes for a start list. Start codes included "conditions," "strategies," and "consequences" (Miles & Huberman, 1994, p. 58). I generated other start codes from my research questions, conceptual framework

and pilot study (Miles & Huberman, 1994). My list of start codes and the source for the start code is in Table 2.

Table 2. Start List of Codes for First Case

Short descriptive label	Code	Code source
Affordance		Research Questions 3, 4,5, 8
• A: teacher	At	
• A: admin • District • Superintendent	Aa	
• A: school	As	
Constraint		Research Question 3, 4, 6, 8
• C: teacher	Ct	
• C: admin	Ca	
• C: school/system	Cs	
Condition(al)	CD	Pilot study, Research Question 10
Strategy	S	Pilot study,
Consequence	CQ	Pilot study, Research Questions 10 and 11
InVivo then	NVt	Used to locate the “3 words to describe IMPACT then”
InVivo now	NVn	Used to locate the “3 words to describe IMPACT now”

As I analyzed the interviews, I expanded my codes. In my research journal, I color-coded the codes so I could keep them in chronological order. Table 3 is the list of additional codes in the order they were expanded from oldest to most recent.

Table 3. Expanded List of Codes

Short descriptive label Individual codes	Code	Code source
Affordance: Students	Ast	First 3 interviews
Collaboration	CO	First 3 interviews
Over Time	OT	First 3 interviews
Sustained by & Not Sustained by	SB	Research Question #1
Definition	D	Used to locate definitions from participants
Change	CH	First 3 interviews
Drive	Drive	
Curiosity	Curiosity	
Training	PD	
Exciting	EX	
Constraints: Students	Cst	
Limitation	Limit	
Leadership		
Resources (things, not people)	R	
Budget/funding/$	$	
Working conditions		
Vision		
(system)		
(people)		
Voice	VY	

After I coded all the interview data for the first case using the code list, I exported only the coded comments. I then grouped all the same codes from every interview into one document. For example, I created a new document of

only codes about Collaboration from all participants who mentioned this concept. As I was creating these documents, I re-read the comments, recoding from time to time. I looked for commonalities such as repeated words, phrases, ideas and words, phrases and ideas particular to small groups or individuals. From these documents I generated themes. The first themes to emerge were mission and vision, people, change and communication. Upon analyzing these themes, these initial themes were collapsed into people and leadership. These two themes seemed to most prevalent as I developed the stories of sustainability (RQ1) and highlighted what afforded and constrained integration (RQ2)

Next, I began reading the school improvement plan and technology plan for Basking. I used the first list of start codes to guide my analysis. Then I compared what codes emerged from document analysis with the codes and themes that emerged from the interviews. Finally, I analyzed field notes for confirming or disconfirming evidence of previous themes.

For the second case I used the same start code list. I discovered some, but not all, of the codes were needed in the second case. "Limitation", "working conditions", and "voice" were examples of codes not used in the second case, while "leadership", "exciting", "drive" were retained. After the first case, I added "tool" to the start code list for the 2nd case. I followed the same method for analysis as in case one.

For cross-case analysis, I looked for similar phrases used by participants, similar situations described, or ideas/events discussed in one case, but not in the

other. The most helpful analysis was comparing the three words then and the three words now for each participant because comparison of words used to describe then and now highlighted key differences between the sites.

Ethical Considerations

For this study, I visited two different campuses. The issue of power dynamics and trust were important ethical considerations in both situations. Because I interviewed thee administration, I had to cultivate trustworthiness among the participating staff members, without compromising myself ethically, if I wanted any hope of obtaining a realistic assessment of the situation.

Additionally, I kept in mind what I know as a member of the faculty of a school with the same grant for the past eleven years and what I would reasonably know as a researcher. I worked remain fair in the probing and follow up questions that I asked (Shank, 2006). I worked to avoid intellectual narrowness (Strike, 2006), or judging my peers by my own definitions of good teaching. This is one reason protocols were so helpful—they facilitated examination of the same phenomenon across time and settings. I worked to avoid another type of intellectual narrowness, or what Tracy (2010) called "relational ethics." That is, I remained mindful of preconceived notions I may have formed about colleagues as teachers to maintain mutual respect and professionalism, and honor our common work.

It was vitally important that I kept researcher memos (Yin, 2006; Maxwell, 2005) and practiced self-reflexivity (Tracy, 2010) to avoid cross-contamination of

sorts, between my biases and preconceived notions and what participants shared with me in interviews. Using the first person perspective in my memos helped (Tracy, 2010).

Above all, it is paramount that I worked within the guidelines of IRB and maintained strict confidentiality concerning all areas of participation (Shank, 2006), and that I communicated those guidelines when asking for informed consent. I did not use teacher names and in such situations where using descriptors identified the participant, I used the term "teacher" or "faculty member" to add distance between the participant and the reader.

Validity

I used Maxwell's definition of validity: "it is a goal, rather than a product . . . it has to be assessed in relationship to the purposes and circumstances of the research" (p. 10). Merriman (2002) offered a slightly different take, but one that was helpful for understanding Maxwell (2005). Merriman (2002) stated validity asks the researcher to answer the question, "How congruent are one's findings with reality?" (p. 25). The goal was to be able to answer extremely congruent, in each set of circumstances under study. This was different from a positivistic perspective because it there may not always be a perceptual experience that can verify validity has been achieved and there was no way to assess validity as an outcome without engaging in interpretation, an activity positivists went to great lengths to avoid (Bredo, 2006).

Countering Threats to Validity

Again, Maxwell (2005) offered a clear and succinct way to counter validity threats: "*evidence,* not methods; methods are only a way of getting evidence that can help you rule out these threat" (p. 105; emphasis in the original). Maxwell's belief that it was evidence that combats validity threats and not methods opened the conversation to more conceptions of validity. Tracy (2010) did not even use the term validity, but "credibility" instead. This sounded more compatible with Maxwell's definition as evidence was credible and easy to believe, or not. What was interesting was that the strategies she offered were so similar to Merriman's (2002) on several levels. Take for example what Tracy (2010) called "member reflections" (p. 844) was just a bigger, renamed category for member checking. Tracy (2010) opted for member reflections because she included "member validation" and "host verification" in this category along with member checks. She made this wider category because all three methods worked the same— to verify interpretations with others involved in the study.

So the question became which methods would help me gather the most descriptive, convincing evidence to counter validity threats in this study? Using the triangulation technique of multiple data collection methods (Merriman, 2010, Shank, 2006; Yin, 2006) was fitting for case study research. Member checking in the form of feedback from participants was another way to obtain evidence that my interpretations did or did not align with the participants' contributions (Maxwell, 2005; Shank, 2006; Yin, 2006, Merriman, 2002). Peer review was

another opportunity to work with evidence in the form of feedback (Merriman, 2002). I also asked for peer feedback to determine saturation and the quality of descriptions. I opted for the strategies that involved people outside of myself, such as member checking, because communication between or among us would create a longer audit trail and more tangible evidence.

Summary

This qualitative study was designed to gain a better understanding of what sustained technology integration school-wide over time as well as what specifically afforded and constrained technology integration at sites where first-order barriers to technology integration were minimized. Case studies were constructed by analyzing data collected from interviews, observations, focus groups, and document analysis at two sites that implemented the IMPACT model starting in 2001.

The sites yielded rich description that led to robust stories of sustainability as well as insights into what afforded and constrained technology integration on a school-wide level once barriers of access and support were minimized.

CHAPTER IV

FINDINGS FROM CASE STUDIES AND CROSS-CASE ANALYSIS

Stories of Sustainability from Basking

The Story of Change

Basking Elementary School was part of a county-city district in the Southern region of the United States. It was one of the city schools. The city had a population over 55,000 in the 2010 Census with just over 20% of the population living below the poverty level. The major employers for the city were education and health services; trade, transportation, and utilities; and manufacturing. The school district was composed of 15 public schools: one early childhood center, seven elementary schools, two middle schools, four high schools, and one K-12 charter school.

Basking Elementary implemented the IMPACT Model ten years, three principals, and three superintendents ago. The principal at the site for the longest period was there for six years. She was part of the administrative team that advocated for and led implementation of the model. There are still signs in the school designating it as a model school. There were elements of the model still clearly in place, while other elements were not. One of the most significant aspects of change over time was the change in leadership, faculty, and students. These changes spilled over into efforts to train new faculty, and was one reason

professional development changed over time as well. Due to external funding for the model expiring, there were further changes in professional development. And yet, some elements of the model have persisted over time. Expectations on the part of leadership to see technology at work in classrooms persisted. The belief that technology use in classrooms can boost student achievement has persisted. Concerns for the overall status of the model have persisted as well.

Turnover. There are faculty members currently on staff who were present during original implementation (two technology facilitators, three classroom teachers, and seven instructional assistants). There has been high turn-over among the students and faculty. One participant remarked that perhaps 25% of the current fifth-grade class attended Basking Elementary as kindergartners (Basking Elementary Family Resource Center, or FRC). As one focus group participant phrased it, “We are a high-risk school and the transition with students and teachers is outrageous each year. There's no consistency here.” Many of the teachers who were involved in original implementation have left the site (instructional technology specialist for lower grades, or ITS-LG). Out of 16 classroom teachers employed during 2011–2012, two remain who were involved in original implementation at Basking Elementary (both are first-grade teachers). All nine instructional assistants, including the two technology facilitators have ten years of experience implementing the model.

Joining the faculty after initial implementation but before funding for the model ceased, were the media coordinator and a kindergarten teacher, both

certified teachers. Next, a second-grade teacher joined the faculty of Basking after working at a school that implemented the same model at the same time, and was also awarded additional funding for exemplary implementation. She had worked at Basking for two years at the time of this study. Looking at the faculty, there were three teachers with training and ten years of experience implementing the model (two first-grade teachers and a second-grade teacher), and two (kindergarten teacher and media coordinator) with five years of experience implementing the model.

Compare those figures with the information about teachers new to the faculty during the 2011-2012 school year. Even though these teacher were not interviewed for this research, the information provided contextual details concerning sustainability. There were sixteen classroom teachers employed during 2011–2012. Out of those 16, seven were new to the site. Additionally, ten teachers out of sixteen have fewer than three years of teaching experience, with most of those ten teachers having two years of experience. There were two additional teachers with only four years. While not clustered together to the extent possible, three out of four teachers in fifth grade were new to the school this year. Not only was the site losing teachers well-versed in the model, they are also losing teaching-with-technology experience. One consistent element of implementation is the instructional assistants. There has been relatively little turn-over in that segment of the faculty.

Table 4 displays a combination of faculty interviewed and not interviewed for this study, as well as the number of faculty members with less than one year of teaching experience, five years of teaching experience, and ten or more years of teaching experience. The trend in the table, that the majority of teachers had less than five years of teaching experience and the majority of instructional assistants had ten or more years of teaching, created an interesting dynamic for sustaining the model. The faculty members more knowledgeable in the model were not directly responsible for implementing it on a day-to-day basis.

Table 4. Basking Faculty Interview/Not Interviewed by Years of Teaching Experience

Teachers Interviewed Ten years	**Teachers Interviewed** 5 years	**Instructional Assistants Interviewed** With Ten or more years*	**Teachers Not interviewed** Less than 1 year
3	**2**	**9**	**7**

*Not all instructional assistants with ten or more years of experience were interviewed for this case.

Compounding the lack of experience implementing the model was the lack of explicit training concerning the model. The principal, media coordinator, five teachers, two technology facilitators, and four instructional assistants interviewed all spoke of the importance of training in implementing and sustaining the model. This will be addressed more fully in the next section. I bring this point to bare now because two key stakeholders in sustaining the model, the media coordinator

and the principal, received no formal training about the model during their work at Basking Elementary. This was a radical departure from the training given to the first principal and media coordinator to implement the model.

Both the principal and the media coordinator sought as much information as possible upon learning they would be working with the school-wide model. While the media coordinator was hired after the intense initial training and one year after funding ceased completely, she worked to educate herself about the model. The current principal, who began working at this site during the 2010-11 school year, four years after all funding ceased, researched the model and sought out knowledgeable individuals at the site to aid his understanding of the model. However, the lack of training offered the media coordinator and the principal were two indicators of change in the perception of the significance of the model over the years since original implementation. The media center was at the heart of the school under the model. When the media coordinator was hired, not only was she not informed of the model being used at the side, the model was not explained during the hiring process at the county level. The principal knew that the site was operating under the model as he was already employed in the school district, but was not given any information about how the model operated. He stated,

> I did not know about being an experienced teacher or administrator in that model. Immediately after being assigned here, I started doing some research, trying to find out what does the IMPACT Model entail and what I should I expect from the staff and what should I try to expect from the students (principal).

When given a list of committees to maintain from his predecessor, the steering committee for model implementation, a committee required to be in place to continue to receive funds, was not among the committees. The current principal stepped into the model already at a disadvantage. However, he researched on his own and sought additional information from faculty and staff to understand the model and how to move it forward.

Persistent Expectations

Although the principal responsible for guiding implementation for six years was no longer at the school, the messages concerning the model and the support she modeled were still part of the memories of the faculty. The faculty that has been at work since at least 2001 at this site continued to voice the goals of the model. For example, one participant spoke of technology integration as a "lifestyle, as a way that I run my classroom" rather than an occasional practice. Participants voiced that the model was not "only about technology" (second-grade) but also about "collaboration" (both technology facilitators, media coordinator, first-grade teacher, second-grade teacher). Although "one part" that is "really missing now is the collaboration piece" (technology facilitator). Even so, the foundation of the goals of implementation remained part of the participants' memory after a change in administration and almost a decade later.

According to participants in the teacher and assistant focus group, under original implementation it was expected that technology would be used "if you wanted to job" at the school "because the data showed the kids were doing better

who used it." However, the principal and assistant principal were "right beside us" and "everybody was learning it." That expectation for use persisted. It was expressed then and "ever since then it's kind of like a known process" (participant). The current principal expected to see evidence of technology use in lesson plans and looks for use during walk-through observations (principal). While observing during some end-of-grade testing near the end of the school year, I observed four classrooms using technology during the first day of my fieldwork. I used the first day as a measure because the faculty did not know of my study until my visit was announced via the morning news on the day of my arrival (first grade, media coordinator, principal).

Persistent beliefs about technology. One aspect of the model that had not changed was a belief that using technology in classrooms "beyond the basic level of competency" (School Improvement Plan, p. 18) increased student achievement. One of the strategies from the model was to raise student achievement by providing access to technology. Basking Elementary School, as required by the state's legislature, must write a school improvement plan and submit it for local school board approval. Referencing the 2010-12 plan, which included the year this study took place, one of the goals was to increase the percentage of students achieving high growth as measured by end-of-grade tests. One strategy was to "integrate technology in reading and math instruction." (p. 18). To achieve this, lesson plans "in reading and math will indicate that technology has been integrated beyond the basic level of competency" as well as

professional development “offered on how to effectively implement technology in reading and math” (p. 19). The inclusion of meaningful technology integration as a strategy to improve student learning echoed several participants’ beliefs about technology use in the early years of implementation.

A first-grade teacher related that she saw more student achievement when she was using the textbook more as a resource than as a primary tool of instruction. The principal stated that when using technology, such as “clickers” to instantly record and display results, it was much easier to target instruction, “because the teachers are getting immediate feedback from using the ActiVotes.” Both technology facilitators spoke to creating “engaging” (ITS) and “fun” lessons that took advantage of the technology resources in the school and put technology in the hands of students (ITS, FTF). According to these participants, using technology helped students learn and grow. In fact, reviewing the percentage of students overall who passed the state’s end-of-grade test in reading and math in grades three through five, the highest pass-rates for Basking Elementary from 2001 (when data was first collected by the state) to 2011, occurred during early implementation of the model (see Table 5). To fast-forward ten years and find included in the formal school improvement plan that technology use, “beyond the basic level of competency” is a strategy for improving student achievement demonstrates a persistent belief in technology as a tool to help students.

Table 5. Overall Percentages of Students in Third through Fifth Grades at Basking above Grade Level by Standardized EOG Test Scores

School Year	Overall Reading	Overall Math
2001-2002	59.6	69.8
2002-2003	65.2	83.5
2003-2004	**73.0**	**89.4**
2004-2005	**72.1**	**86.1**
2005-2006	**74.1**	**49.3**
2007-2008	31.7	42.3
2008-2009	43.1	63.3
2009-2010	44.9	55.1
2010-2011	39.7	50.2
2011-2012	37.7	48.1

Persistent faculty concerns. Another facet of persistence was the concerns of the faculty. The particular concerns voiced reflected persistence because the concern of the faculty was the erosion of aspects of the model. If erosion of the model were not of concern to the faculty, the model would be allowed to wither rather than pondering how to stop the erosion. For example, one concern voiced by both focus groups, the principal, the media coordinator, one technology facilitator, one instructional assistant, and teachers was training new faculty in the model. Faculty new to teaching and new to the site faced a double-hurdle of learning how to teach, and learning how to teach with technology (principal, technology facilitator, teacher and assistant focus group,

media coordinator). There would be less concern or planning for training new faculty if the current administration was not willing to maintain the model.

Even as a continued understanding of the original goals of implementation on the part of participants trained in the model ten years ago and expectations for use have persisted, what has not persisted is a school-wide passion for implementation. The media coordinator noted that there was a commitment and “passion” that faculty members not trained in the model did not achieve. Two classroom teachers and two instructional assistants noted that there was not a feeling of importance attached to implementation any longer. One participant noted, “We still have signs up that say this is an IMPACT Model school, but I don't see that. I don't feel like or see it in our school that we are an IMPACT Model school. . . . Now I don’t see that want for it.” Lack of “want for it” may be an indicator that what was once “known” among faculty members deteriorated as the faculty changed since original implementation.

Collaborative planning has also eroded over the years. “The collaborative piece has really been difficult to sustain this year. We have a lot of new staff” (technology facilitator). There are also scheduling conflicts created by mandates handed down to the school. “With our teachers we have PLCs, but I don’t get a chance to be in there with them and the media specialist. So we can’t sit down and do all those wonderful lesson plans. . .because of the way our schedule is” (technology facilitator). The “way the schedule is” was the technology facilitators and the media coordinator were working with students while teachers planned

together as a grade-level. This situation was linked to changes brought about when the school was designated as low performing, as determined by the state department of public instruction's guidelines (technology facilitator).

The media coordinator voiced an additional reason for the erosion of collaborative planning. Under original implementation, when funding was provided to the school as long as they met the model's criteria, substitute teachers were employed to be in teachers' classrooms so teachers could attend planning. When funding ceased, it became difficult to provide funds for substitutes. When the national and state economies took a downturn, funding substitutes for planning was no longer feasible (media coordinator) and funding substitutes for planning days was discontinued. This concern was echoed by the participants in the teacher and instructional assistants' focus groups.

Over the years there has been significant change at this site and this district. Changes in leadership at the county level coupled with high turn-over in the student and teacher populations led to "the system eroding" (media coordinator) over the years. Fewer faculty members were currently employed who were initially part of the model implementation. When new faculty came on-board, there was no professional development regarding the model for key leadership positions and few professional development opportunities for teachers. As a result, faculty and staff had to rely on what they can learn through their own research and the single-session professional development offered on-

site throughout the year. Consequently, intertwined with the story of change is the story professional development.

The Story of Professional Development

The role of professional development (PD) a faculty for implementing a school-wide initiative is multifaceted. During the initial implementation of the IMPACT Model, schools accepting the grant were required to spend 25% of the budget on PD. Trainings at that point in time consisted not only of how to use particular software programs, but also how to collaborate with grade-level peers as well as the media coordinator and technology facilitator, how to utilize the media center and computer labs through open access, how to work with the media coordinator and technology facilitator through a flexible schedule, and how to integrate technology into classrooms rather than adding it on to lessons. Even though these types of trainings occurred over four years, participants spoke of the “intense” nature of that time and all recalled the hours of training in which they engaged. Professional development was not restricted to more traditional workshops or presentations and demonstrations. Part of the model’s implementation required participating schools to visit each other. The steering committees from each of the eleven schools visited each of the ten other schools and typically brought ideas back to share with their respective faculties.

The media coordinator, who joined the faculty in year five of implementation, observed the faculty who participated in the first four years of training. She noticed their passion for the model, even five years out from

implementation. She noticed their commitment to the model in their reluctance to discard older technology purchased with funding during the initial round. She felt purchases made initially were “intentional” and that “everyone had.” There was no feeling of have and have-not among the faculty, including instructional assistants. Drawing conclusions about initial participants, the media coordinator felt that the intense training experiences might have contributed to the passion and commitment she was observing. Working together though such a monumental-seeming task perhaps created collegiality and commitment to the model that persisted.

A concern remembered by one instructional assistant, one technology facilitator, and one teacher was the time out of the classroom to attend training. Many trainings offered were either located far enough away to necessitate overnight travel or far enough away and more than one day in duration. The extensive traveling caused anxiety for some participants. However, when asked what facilitated implementation, training was the most common answer. Participants in the study repeatedly stated that professional development diminished anxiety and developed collegiality (FR, focus group, teachers). When working through sessions in which participants had to try something new or reconsider their teaching practice, they “learned real quick to work together” (FRC). Training, then, was a source of anxiety, but also a tool that facilitated implementation and collegiality.

Another role of training was to give faculty members an opportunity to shine. The principal who facilitated initial implementation was known to push faculty members to present at the school. According to one teacher, “She [the principal] would come and ask . . .us. . .to help her out.” Participants in one of the focus groups also spoke of the former principal. A participant stated,

> she utilized the people that [were] right in her building before she would go out. A lot of time, a lot of people wouldn’t even volunteer. She would volunteer that person. That would make you go ahead and show your skills.

Another focus group participant commented, “sometimes a push from certain people will bring out the best in people.” The confidence gained by these participants perhaps contributed to them presenting information about technology use at local and regional levels as well.

When MTAC members returned from visiting other schools, “best practices were shared” with the rest of the faculty (media coordinator). Ostensibly, when other schools visited Basking Elementary, they left with a few best practices to take back to their own schools. Additionally, Basking Elementary welcomed visitors from schools not participating in the model, but hoping to see how school-wide technology integration, collaborative planning, and open access to the media center and hardware worked (media coordinator).

As might be expected, participants did draw conclusions about the age of faculty members and willingness to embrace technology use in particular. Those conclusions were expressed in relationship to training. Several participants

stated that younger faculty members would help veteran teachers through workshops. Participants stated that it was the veteran teachers who were the most excited about the infusion of technology into the school. Only one participant stated that the younger faculty members were impatient with the older faculty members.

> You had the younger people who had the technology knowledge, and this is all great and all fun to them. Then you have the older ones that just didn't have the opportunities, and it was like [a fellow participant] said, a huge learning curve all at one time. So you have that little peer pressure going on back and forth. Like, 'what do you mean you don't understand this'.

While this was the only direct mention, and the participant sharing this described herself as being "sacred to death" when she was faced with the model, coming back to work as a kindergarten teacher when she was 46. However, not only did she come to view the model as "a really good learning experience," she also felt it was "nice to have some younger people on staff that new more about what they were doing." She made it a point to "always find somebody to sit beside that knew what they were doing."

Also interesting to note that the principal, the media coordinator, one technology facilitator, and the participants in the teachers and assistants focus group all made the point that teachers new to the profession were not savvy technology users, nor was that their focus. The focus of teachers new to teaching was how to teach, not how to teach with technology. While these statements may seem to contradict one another, it may be possible that each of these situations

(novices helping veterans, veterans excited about change, novices impatient with veteran teachers, and new teachers focusing on pedagogy) are not mutually exclusive. However, if a teacher were new to teaching at the time of initial implementation, s/he would have had intense professional development on using technology in the classroom in addition to learning how to teach. Since funding has ceased and the scope, frequency and duration of professional development have waned (TF-lower grades, media coordinator). Teachers new to the profession and new to the site did not have the opportunities for sustained professional development that once existed at this site. Lack of training focused on the meaning of the model was a concern voiced by nearly every participant.

Overwhelmingly, the faculty members were aware of and concerned that new faculty members, even if they were veteran teachers, had less access to professional development about the philosophical underpinnings of the model, collaboration and flexible access to resources in the building (second-grade teacher, instructional assistant, media coordinator, technology facilitator), or they do not ask questions concerning the use of technology (technology facilitator, media coordinator, principal, media assistant). The lack of professional development beyond hardware and software use has led to a lack of "understanding" what previously defined the school and shaped the school's culture. The story of the media coordinator's role over time highlights this situation.

Media coordinator's journey. According to the IMPACT Model, the media center should function as the activity hub of the school and the media coordinator should function as one of two people who plans with every grade-level in the school to support media literacy, book and print awareness, contributes to and participates in lessons designed with grade-level teachers and the technology facilitator. The faculty was trained in how to plan collaboratively, what it meant to have flexible access to the media center and computer lab, and given guides for developing robust units of instruction utilizing the available hardware, the technology facilitator, the media center, and the media coordinator. The media coordinator at Basking Elementary was not hired until after the bulk of these trainings were completed. As noted previously, the interview team did not discuss with the media coordinator that she would be working at an IMPACT Model school, what the IMPACT Model was and what her role within the model would be. When the media coordinator began working at Basking, she quickly realized she needed to more fully understand the model. She worked to educate herself about her role and the role of the media center and associated resources.

It was an era of abundant funding which provided for hardware, software, and training for the faculty. She realized that initially the distribution of resources was "very intentional" and that "everyone, teachers and instructional assistants, had." Along the way she began to see a passion for this way of teaching on the part of teachers who were participants in the previous years of training and initial implementation. Even in 2011-12, there were resources that were almost a

decade old that faculty was clinging to because it was part of the original grant and someone always stated they wanted to keep that resource (media coordinator).

She did not see the same passion on the part of teachers hired after 2008. She began to theorize that something about the previous years of training created a commitment to the model for those participants. Then, as funding from the state ceased and the state and federal budgets began to shrink, there was less and less money for resources. Eventually budgets at both levels became so constrained that there was less money for professional development as well. As the media coordinator watched the shifting of fiscal priorities, she noted the model and "the system is eroding." For example, it was no longer financially feasible to fund substitute teachers to allow teachers to plan collaboratively during the day. Under the first four years of implementation, substitute teachers were funded with grant money periodically to allow teachers to plan collaboratively with the technology facilitator and media coordinator. When the funding ceased, the administration faced the question of how to continue to support the planning process without using substitute teachers. Meanwhile, the district submitted a proposal and was awarded Race to the Top funding. Part of that district plan mandated and intervention block be included in Basking's schedule. To adhere to new scheduling guidelines and allow for planning times, the media coordinator and technology facilitator joined the enrichment teachers in working with groups of students so teachers could plan. While this addressed

the planning issue on the one hand, it also took away the media coordinator and technology facilitator from the planning process.

Another consequence of lack of funding was diminished training for newly hired faculty. Training for newly hired faculty did not address the model to the depth that initial training was able to. This contributed to systemic erosion because newly hired faculty did not develop as clear an understanding of the role of the media coordinator and the media center (media coordinator). Eventually, the media coordinator did not feel she was being utilized to the fullest extent possible and “sought other ways” to contribute to the school. Subsequently, her role shifted to “administrative duties” (media coordinator). This shift did not go unnoticed. The teachers and assistants who were part of original implementation observed that the media coordinator’s role had changed over the years, but did not speculate why in the focus group. However, the media coordinator attributed the underutilization of the media center and the media coordinator to a lack of understanding on the part of faculty members. For example, while the principal stated that he supported a flexible schedule, the media coordinator is not sure what the principal means when he speaks of flexible scheduling. As these two stakeholders did not receive any formal training but trained themselves, it is possible that they have reached two different definitions of flexible scheduling. Similarly, the newer faculty members are still questioning the media coordinator as to the role she plays in facilitating instruction (media coordinator). Again, the media coordinator attributed this to lack of training for newer faculty members.

On the other hand, faculty members trained in the model realized the role of the media coordinator had shifted. Because of this shift, the media coordinator was not always available for teachers who did try to schedule activities with the media coordinator. This led to some frustration as the teachers felt they were not able to implement the model at the extent they once did. The media coordinator also recognized this and commented again about the “erosion” of the system. And yet the media coordinator felt obligated to work for students and faculty to the greatest extent possible, which is what propelled her to seek other ways to serve students and teachers since the work she was doing through the media center was not fully understood by a majority of faculty members and therefore underutilized.

The leadership in this situation did not, at the time of the study, seek to provide training in how to use the media center and the media coordinator to slow down erosion of the model. Without the training in the model, a solution to underutilization may not have readily presented itself. Additionally, with the added requirements from the district and state level to address the school’s low academic performance, the work of the school may have been focused on classrooms rather than the media center and classrooms.

Ultimately, as professional development has shifted to software, hardware, and online resources to use in classrooms and away from collaborative planning and teacher, and away from understanding flexible access, an underutilization of the media coordinator’s role and the media center itself has occurred. Faculty

members well-trained in the implementation of the model have noticed this shift and are, at times, frustrated by it while newer faculty members are not aware of the possible opportunities afforded by working with the media coordinator, technology facilitators, and members of their grade level.

Overall, awareness of the meaning of being an IMPACT Model School, practicing collaboration, flexibly scheduling the media coordinator and technology facilitators, while maintaining open access to the media center and computer labs is deteriorating as funding decreases, trainings take a different direction, and there is high turn-over among leadership and teachers.

Affordances and Constraints

To better understand what afforded and constrained technology integration at Basking Elementary, it became necessary to take a more system-based perspective. The work of educating children created one system that involved parents, teachers, students, and administrators collaborating among and between each other. Another system created around Basking was the work done in the community through the Parent Resource Center, volunteers, and partnerships with faith-based organizations. The Family Resource Center (FRC) was part of the original model. A local community college collaborated with Basking to offer classes for family members of Basking students on the campus of Basking rather than the community college. At the time of this study, a former teacher at Basking was one of two staff members at the FRC. She coordinated

the volunteer program, and facilitated a food pantry and clothes closet for students.

Because Basking was one elementary school within a district, an administrative system surrounded and encompassed Basking. Basking Elementary made decisions as a local education agency but those decisions had to align with, or at least not work against, district initiatives. The same situation occurred between district and state levels, and between state and federal levels. Decisions made at the higher-ranking level carried the expectation they would be followed. The Race to the Top (RTtT) federal education funding program was a good example. Even though the RTtT was not implemented until well after the IMPACT Model, because the state accepted those particular federal funds, local school districts were committed to specific courses of action by the state department of public instruction. For Basking, the changes constrained implementation because the new schedule compromised the opportunities the media coordinator and technology facilitator had to plan with grade-level teachers.

There were several systems at work within this case. Within every system and at every level there were people at work. People propelled forward or thwarted the progress of the initiative. This was true of Basking Elementary. Within the systems of district- and school-level leadership, school-level leadership and faculty, and faculty and students, there were many instances of

how and when technology integration was promoted and constrained at Basking Elementary.

District-level Leadership. On two occasions, over the years, the district made decisions regarding technology use at Basking. “A few years ago” the desktops in the classrooms were “piggybacked,” making fewer individual work stations (classroom teacher). The teacher further explained, “The school system decided it was what we were doing. That caused a hindrance because some of the things we are using,. . .you can’t have on three machines. It will only let you do it on the main” machine.

Second, all televisions were removed from the school. A participant stated that equipment was “redistributed” by the county office. Flat panel monitors were replaced with CRT monitors, televisions, and some hard drives were taken out of classrooms (participant). Her concern was, “this was for the kids” and it was taken away." One explanation for removal of the televisions was abuse of the technology, as in students watching television as a reward, rather than for instruction (participant). Another explanation arose during the focus group with teachers and instructional assistants.

Prior to the removal, one participant expressed concern that the system in place was not working. “Well, they didn’t listen to that at the district level and took all of our TVs” and “put WinTV in everybody’s room. When this happened the student-run “morning broadcasts basically died” (focus group participant). The perceptions stated here may not reflect the full scope of the decision-making

process involved in removing the televisions from Basking. However, the examples illustrated the relationship between the district and the school. Equipment removal was not a decision originated by the faculty and staff at Basking Elementary, but rather the district level. Participants were not giving the same reasons for removal, indicating a clear reason may not have been delivered to the faculty or the reason given was not clearly understood. Additionally, the removal of equipment was perceived as negative because it removed equipment intended for students and ended the televised morning broadcast. The actions of the district hindered implementation in these examples.

There was the perception among participants that Basking was not treated the same as other elementary schools within the district due to implementing this model. Recalling the previous example of the televisions and WinTv: “it’s still at the other schools that didn’t have IMPACT.” The participant made the follow-up comment that Basking, “suffered some things” due to model implementation. For example, equipment was not rolled out across the district at a pace perceived as equitable. Participants felt as if new equipment, purchased with district funds, were held back from Basking. For example, the district was preparing to use iPads at the elementary level. Participants at Basking perceived they will be among the last to implement the iPads because they already have more equipment than other schools in the district (two classroom teachers, technology facilitator). Another participant stated, “they feel like that we’ve gotten things before them, they should let other schools have access to newer resources

before we get them.” Although the “they” was never specified, “they” was probably not referring to school-level decision makers because the decisions about resource allocation as described in the quote appeared to concern multiple schools A third perspective was offered by another participant, “people assume because you were an original IMPACT model school that you are always going to have the funding and things in place to continue at that level” commensurate to the first years of implementation.

Counter to these examples of the faculty who felt slighted by equipment allocations, one participant also explained, as “the other schools are starting to get where we are with technology, a whole lot more sharing among all the schools” took place. In spite of an example of a benefit to distributing resources around Basking rather than inside Basking, the district’s decisions about resource allocation were overwhelmingly perceived to hamper further implementation. Under the guidelines of the model, a technician was required to work on-site at Basking. Over the years, the technician was removed from the site, as per the district. At the time of this study, all hardware and software related requests must be reported to an off-site technician who only visited the school one day a week. Visiting one day a week to make repairs and perform routine maintenance hindered implementation (first, technology facilitator, principal) in a school with abundant technology that was starting to show its age (second-grade teacher).

Recall one condition for qualifying for the model in the first place was support from the Superintendent and the district. Also, recall there were three superintendents in this district over the past ten years. Ostensibly, the first superintendent supported the model, or the model would never have been in place originally. Compounding the perception of being slighted because of model implementation was a visit made by the current superintendent. Known as a "gadget guy" (media coordinator) and a proponent of technology use (FRC), the current superintendent visited the school to see how many teachers were integrating, not just using, the technology in their classrooms (principal). The visit was part of the superintendent's efforts to observe and plan during his first 100 days as a new superintendent. The superintendent did not see "people using the technology they had" (classroom teacher). However, "Those of us who were using it were like, 'We didn't see you come into our rooms.' Even with technology you are not going to be using it every minute of every day" (classroom teacher). The participant allowed space in her comment that the Superintendent observed her without her realizing it, but felt slighted, nonetheless, that teachers were using technology and use was not recognized. However, in the focus group, participants made note of how impressed the superintendent appeared to be while watching the technology facilitator control his Activeboard with his iPad.

Not all was negative, however. Overall, while "we did run into some glitches with it, but once they [the superintendents over the years] understood what we were doing, I think they were very supportive of it" (first-grade teacher).

The media coordinator looked to the superintendent in office at the time of this study to resolve issues at Basking because “He is big on technology, so he has a big push toward making sure that we have iPads in every school, and we have mobile carts in every school.” With this as a goal, “some of this may be resolved or fixed . . . because of his big initiative for technology.”

The FRC commented the superintendent, “is really on board as far as expanding the technology.” She also commented, “I think a lot of [facilitating student use of technology] had to do with administration, especially [the] superintendent. I think that has a lot to do with whatever is most important to them. And then budget.” A second-grade teacher recognized that the “county has in some ways supported maintaining our resources here” because new laptops and mini-laptops were purchased in the previous three years. Focus group participants felt, “the district is constantly looking at ways to support technology.” The Family Resource Center received equipment over the summer through district-level support. One of the technology facilitators also commented that the district offered trainings that faculty at Basking would need.

Overall, the relationship with the district in general worked to promote and constrain the model over the years. At times, the district-level administration may not have fully understood the model, or for reasons not fully understood by the faculty at Basking, and consequently made decisions that seemingly hampered the model. However, the district did supply new equipment, even if not to the same degree at all schools across the district. Basking also had access to district

trainings for technology use. The decision to allocate equipment to other schools within the district before Basking may not have been as detrimental to Basking as perceived because of the avenues for collaboration opened up among schools in the district.

School-level leadership. Of these three principals assigned to Basking, the first principal and the current principal generated the most discussion among participants. Mrs. First Principal motivated her faculty and staff to implement the model and clearly communicated her expectations. The principal at the time of the study worked understand the model and assist faculty in utilizing the model. However both principals faced situations that hampered the model as well.

Several comments from the teachers and assistants focus group illustrated how the first principal motivated her faculty to initially implement the model. “She was right beside us, and the assistant principal was right beside us, learning it, too. [Be]Cause she wanted to know how to do it. It wasn’t like, ‘You’re going to learn this’ and then she disappeared.” The participants viewed the leadership’s participation as encouraging. The model was not something that the administration was going to implement in name only or ask the faculty to engage without support. The media coordinator commented that, “she [the principal] was there every step of the way so she understood the collaboration model, the importance of teachers getting together as a group.” It was not only that the leadership was willing to participate in trainings with faculty, but also because of the training she attended. She had a deep understanding of the model.

Administration “strongly encouraged” faculty “to try to do a little something every day to implement something they had learned in the workshop or professional development” (focus group participants). A first-grade teacher shared the exact information in her interview. She stated that after “different PLCs weekly and staff development. . .I come back and I really try with my classroom . . . to incorporate it.” At the same time, participants perceived that, “not learning the technology wasn’t really an option” (teacher-assistant focus group). “I don't know if I should say ‘forced’ on us, but it [technology] was here, and we had to use it. It was no excuse not being able to use it” (teacher-assistant focus group). An instructional assistant stated that,

> a few years back, it came from the administration. Ever since then, it’s kind of like a known process that you . . .need to be using the hardware in the classrooms. We know that we need to be using these things with the children at all times (instructional assistant).

The kindergarten teacher clearly remembered the expectations: “You have the technology. Use it. It has to be used every day. It’s not just an overhead. The children have to go to the board and actually manipulate it.” The media assistant commented, “we had to implement it.” After ten years it was still clear what was expected from teachers.

The administration encouraged the faculty to share knowledge and skills with colleagues. If the principal knew that a faculty member had knowledge that needed to be shared, “she would volunteer that person. She’d say, ‘You can do it.’ That would make you go ahead and show your skills” (focus group

participants). The first grade teacher noted consequently she was “able to network with a lot of technology people across the state” and present at regional conferences.

The administrative staff during original implementation was supportive. They provided, “so much with the input for the IMPACT grant to keep it ongoing” and were, “supportive in the challenges we face. That’s been very helpful to me because I’m no longer intimidated by technology” (first-grade teacher). Additionally, the trainings offered were another type of support (first-grade, kindergarten, focus group participants, technology facilitator, FRC).

However, not every situation worked out for the first principal. Teachers used three days a year to plan collaboratively as a team with the media coordinator and technology facilitator. When faced with a shrinking budget for implementation, changes to the model followed. “In terms of that collaboration, she couldn’t, financially, couldn’t afford to give those three days” to teachers (media coordinator).

Although two participants expressed “over the years, I think our leadership has been good” (technology assistant) and, “So far, every principal we’ve had has been very supportive of it” (first-grade teacher), participants did not share specifics about the second principal’s work to sustain the model. The principal at the time of the study was working to sustain the model in the midst of affordances and constraints.

The principal at the time of the study worked to educate himself about the model as soon as he learned he would work at Basking (principal), and strove to support technology integration. He tried to model technology use, in at least three different situations. First, he modeled use during walk-through observations in teachers' classrooms. Second, during staff meetings he would "try to model for the teachers different uses of the technologies." Finally, he stated the "professional development team tries to model" technology integration (principal). I was able to attend training during my site visit. The training was equal parts how to use the Internet-based resource and how to use a balanced-literacy approach to teaching reading. As the principal stated, "it's one thing for me to keep telling the teachers, 'I want you to use technology, but they need to see what does that look like." Not content to express what he wanted, he modeled and asked others to model use as well in an effort to support the model implementation.

As previously discussed the principal at the time of the study was faced with a "learn as you go" situation (principal), where the first principal had extended, in-depth training. "What I do think was a steep learning curve for me is coming into a school that had had the model for several years with very minimal to no real training" (principal). Understanding the role training played for participants and the first principal during initial implementation, "steep learning curve" was perhaps an understatement.

Another situation new to the third principal was balancing expectations of use and sustaining aging equipment.

> You look at the years this equipment has been in use, the more we are using it, the more we say to teachers, 'Put it in your lessons,' I also have to be very realistic. It's not going to last forever. . . .Can I sustain the use of it in this type of budget that we find ourselves in?. . . Now, I have to really, really be careful of what I expect the teachers to do with their equipment (Principal).

Couple the worry of maintaining equipment monetarily with the weekly repair schedule. It was possible that equipment could malfunction on Tuesday of one week remain broken until the next Tuesday when the technician visited the school (principal). Fortunately, the principal recognized this situation, as far as expectations of use. In both situations, hindering implementation was the dwindling budget and maintaining aging equipment.

There were many people new to Basking during the 2011-12 school year when this study took place, including the principal (technology facilitator, focus group participants). It would be difficult for the principal to know his faculty as the first principal knew her faculty, which, in effect minimized a motivational tool the first principal used. However, the current principal also called on faculty members to help him. What helped the principal, "most was having individuals in this building how had lived it, who knew it, who had been through the training . . . I had to literally go to [technology facilitator] for an understanding of what it meant" (principal). Both administrators asked faculty to model for their peers. Administrators worked from different levels of familiarity with the model. The first principal had much support and guidance with implementation and was learning along with the faculty and staff while the third principal had "little to no training" or

support. Additionally, by the time the third principal arrived, the majority of faculty had little to no training in the model.

A constellation of factors surrounding Basking shifted school practices over time, working against the model. The teacher-turn over, the administrative turn-over, and balancing use and maintenance of equipment under ever-shrinking budgets resulted in reconsideration of what “use” looked like in practice.

The media coordinator noted that, “leadership. . .are the ones who are going to make it relevant or not.” The school-level leadership worked to promote the model initially and at the time of the study. The first principal and assistant principal’s willingness to roll up their sleeves and learn along with the faculty motivated the faculty. The first administrative team also motivated teachers by recognizing their strengths and providing opportunities to share strengths with peers. The principal at the time of the study worked to educate himself about the model to have realistic expectations of faculty and students (principal). He also worked to model technology to assist teachers with integrating technology not, “just another facet, but it really becomes integrated” into teaching (principal). The first administrator sought to make the model relevant and the third administrator sought to keep the model relevant while faced with very different human, capital, and physical resources. While a non-classroom teacher cited administration as the key to model implementation, the administration cited teachers.

Basking Elementary faculty. The principal noted that, “the teachers, they are the decisive factor. They either make us or break us to a certain degree.” After listening to participants discuss obstacles and successes surrounding implementation of the model at the classroom level, it appeared that both the principal and media coordinator were correct in their assessments. Obstacles faced by teachers included the pace of change, professional development and faculty turn-over, and disposition. Teacher dispositions toward training specifically and toward their work in general facilitated model implementation.

***Pace of change*.** A first-grade teacher and the FRC spoke of the pace of change during initial implementation. “Intense” and “apprehensive” described the pace of change, “because it was so much to try to learn” and “we had to learn a whole lot of stuff we didn’t know (first-grade). “Going from not using to technology to immediately being given a list of things that you have to implement. That was hard” (FRC). A classroom teacher stated that there was an “overwhelming part of everything happening in a short time frame. Once we got it and were able to be trained on it, I think we were fine.” The technology assistant shared a similar perspective, “It was just a little time-consuming. But once you learned it, it’s not time-consuming because it actually seeds the process up.” In addition to training being time-consuming and overwhelming, teachers were anxious about the amount of time required out of their classrooms to attend training (media assistant, technology facilitator).

Initially, the pace of change and the expectations may have slowed implementation, but training seemed to mitigate apprehensions. Examining disposition toward training as an obstacle and a facilitator of the model, the people involved and their reactions to training serve as one factor of affordance and constraint.

Professional development. Professional development depends on people, at the very core. Someone has to plan and present the professional development. The media coordinator and technology facilitator provided training and were “very knowledgeable of how to use all of this equipment and stuff, so it’s made me feel more comfortable with using it” (instructional assistant). Training eased fears about implementation and excited participants. “If you learning something exciting, you can’t wait to take it back to your classroom” (FRC). The participants in the teacher-assistant focus group commented, “It's funny how we would be running from room to room when we didn't understand how to do something. "Can you show me how to do blah, blah, blah?" The intentional practice of new skills and resources demonstrated dedication to the model.

Several participants spoke of the collaboration that occurred during professional development then (first-grade, FRC, technology assistant) and now, with new faculty (Kindergarten teacher, technology assistant, teacher-assistant focus group). An example of structured, informal collaboration follows. The focus group participants spoke of informal trainings during the early years, when they

would stay after school and work together. “That really wasn’t survival. That was, ‘let’s figure this out together.” Another participant explained the procedure. There were faculty members who “did know how to do it” and were “willing to stay over with you and help you.” Once the number of people staying was emailed to the person who agreed to help, it was “get in the lab and work” (focus group). In this instance, faculty desire for training, willingness to organize their own, additional trainings, faculty willing to lead informal training, facilitated model implementation and demonstrated a drive to sustain the model.

At times, training was not convenient to attend (instructional assistant). “Everybody can’t stay after school to learn it, even though it’s offered to them. Sometimes, you need help other than just after school” (teacher-assistant focus group). Another concern was, “a person is not as willing sometimes, to go right then to show them. It’s like, ‘I need this, but I don’t have time’” (teacher-assistant focus-group). On the other hand, the technology facilitator was noted for assisting “all the school. It’s up to them if they go in there to take it or not. It’s offered to them, though” (teacher-assistant focus group).

From one perspective, participants were frustrated because professional development did not always fit their schedule. On the other hand, it was acknowledged that PD was scheduled and it was up to the faculty to take advantage of what was offered. Dispositions toward PD were further complicated by the other responsibilities placed on teachers, particularly newly hired and

teachers new to the profession (teacher-assistant focus group, instructional assistant interview).

Professional development and new teachers. Participants in the study voiced concerns about PD for new faculty (teacher-assistant focus group, principal-technology facilitator focus-group, media coordinator, second-grade teacher, principal, media assistant). The technology facilitator stated that "especially for the new teachers. . .even some who transferred within the district" there was a need "to have more awareness of how to use our resources." Several participants echoed this statement. The technology facilitator stated, "A person comes. You train them on the technology. The next year they are not here and you have to train another person." "There's always somebody constantly leaving, somebody constantly coming in, and it's hard to keep up with making teachers aware of what they have access to other than just your computers in your classroom and your Activeboard" (second-grade teacher). One participant, reflecting on available technology resources wondered if, "new teachers" were "not fully aware of what the software [Basking] has, or being aware and still not doing it." She attributed this to new faculty members possibly not asking questions of the other faculty.

The principal offered a counterpoint. In his interview, the principal shared teachers, "young in the profession, have to know how to tap into your resources and how to ask for help" (principal-specialist focus group). Then he added, "sometimes, they don't know the question to ask even if [the technology

facilitator] and [the media coordinator] or anybody else as a resource offers the help." Not only did he suggest that inexperience with the model may hamper the new faculty's ability to ask pertinent questions, he brought up the double burden of being new to the model and new to teaching. "Beginning teaches have a lot of things on their plate," and may not be able to set aside additional time for help (teacher-assistant focus group). At Basking, "We have a lot of new teachers who are having to learn how to teach along with how to use the resources" (principal). Perhaps it was a lack of training that led to underutilization of the media co-coordinator, in turn leading her to reinvent her work to remain a vital part of Basking. In either case, model implementation is hampered by high faculty turn-over brining new faculty on board who have little access to sustained professional development in model implementation.

The faculty's response to training was dual in nature. Change came rapidly. Some trainings were not convenient and there was not always someone to help at the point of need. Concerns about new faculties' lack of professional development may have lead to frustration as there were no readily available answers to address the concerns. And yet, there was commitment to use what was learned through professional development and to help one another to the extent possible. Based on individual interviews, the willingness to apply knowledge gained through professional development stemmed from drive, curiosity, and a feeling of challenge from individual teachers sustained implementation.

Dispositions. Recall Pajares' statement that “Beliefs must be inferred” from what teachers say and do and how teachers respond to problems (Pajares, 1992, p. 315). From that perspective, teachers' dispositions may act as a lens to infer beliefs. At Basking, “you have people who are willing to actually use it [technology]” (teacher-assistant focus group). “I can truly say with this group right here, we use it. We are not intimidated by it. . . I think everything was pretty much successful because we did it. We utilized it” (teacher-assistant focus group). Keeping in mind Basking was awarded additional funding for exemplary implementation, the granting agency would agree with their assessment. These participants felt they “benefitted from it because I used it. It was here. It was hard not to use.” These last two comments speak to the drive teachers felt. When given an opportunity, they took it.

Several teachers spoke of why they engaged the model. A first-grade teacher said of the model, “It was wonderful because it was something new for me. I took it on because it was something I wanted to learn and enrich my classroom.” She viewed the changes and challenges as “a chance to explore and not be so intimidated by technology, but advance the students with this technology.”

A kindergarten teacher spoke of, “curiosity and my wanting to stay on top of technology because it is changing all the time,” and being “curious” when you “go into a classroom and see somebody actually using it and manipulating it.” She also spoke of a need to “keep using it. I had to keep practicing, practicing

and using it. Trial and error. I had to keep at it." Two adjectives come to mind: curious and driven. Not only did she attend "as many [trainings] as I possibly could," she "even explored on my own." She was not the only faculty member to pursue information on her own. Two faculty members went back to school, pursuing an advanced degree in instructional technology due to their experiences with the model (first-grade, second-grade).

Traces of drive are in a previously quoted comment from the teacher-assistant focus group. When they stated that staying after school was not "survival" but "Let's figure this out together," it was a statement of drive and collegiately. As the media assistant commented, "we did it as a team."

Teachers were reflective (first-grade, teacher-assistant focus group). Teachers and instructional assistants were asked to reflect weekly, in a journal, about their implementation of the model. Reflection was not a practice that ceased when the funding ceased. The first-grade teacher stated, "I reflect on things that I can do better and improve on." Note the present-tense verb.

One piece of the model that suffered over the years was the collaborative planning piece. As discussed earlier, this was due in part to schedule changes preventing all the members from working together. However, dispositions played a role in the erosion as well.

Collaborative planning was "a little unsuccessful" because some teachers would close their doors and teach with a "'we've always done it this way'

mentality" (teacher-assistant focus group). There were also teachers who "didn't try or just didn't use it" and "were at a loss." (teacher-assistant focus group).

In general, the disposition of the faculty was positive, a mix of drive and curiosity that propelled implementation and sustained it, and age did not appear to be a factor in defining teachers' dispositions. The technology facilitator stated, "you [have to] have those people who understand that model and who are willing to do things to make it work." That statement summed up the disposition of the veteran faculty at Basking. They understood the model, as evidenced by what they thought was working and what was not. They were also willing to do what it took to make it work, as evidenced by what how they discussed their work. A teacher stated that even though there were expectations for use, "Once you are behind your closed doors…You could take it or leave it, but I chose the better." This quote was of the reality of technology integration on a classroom level, the speaker's disposition toward technology use, and probably the veteran faculty's perspective as well. Student reactions to technology integration supported the interpretation that using technology is "the better" way.

Students. Students were not interviewed for this study. Comments concerning students emerged from the data and provided a more complete picture of affordances and constraints. In short, faculty were compelled to implement the model because of the opportunities for students accompanying the model, increased student engagement, and teachers' improved ability to target instruction. Several constraints surfaced as well. One participant discussed

the familiar constraint of students abusing access to the internet, but from a different point of view.

The majority of comments concerning students discussed the exposure to the world outside of their community as well as future opportunities. An instructional assistant shared, “it’s a great thing because the kids do get exposure,” and “children most definitely need this exposure.” The media assistant shared she was “constantly trying to introduce new things to kids because a lot of them might not have that experience.” A teacher-assistant focus group participant commented the model, “gives this type of clientele, high-risk students, a chance to see something other than just the norm.” The ability to show students, “different career possibilities . . . it’s given them a different insight on something else they could be in life” (teacher-assistant focus group). The media assistant made a similar statement, “I think it can allow our kids to have a broader view of what career they can go into. No just, ‘okay, I want to be an RN’ but specific, like oncology, maybe.”

The Family Resource Center staff member commented, “it’s [the model] probably what got us as far as we have been brought because this school is so low as far as economics that without the IMPACT Model, I’m not sure where we’d be right now, technology-wise.” She also shared, “it has made vast improvements in how to teach our children in a world that’s so filled with technology.” She recognized that the world was becoming more technologically savvy around students in a geographical region that might not have been able to

provide the tools to help students more fully participate in the world. The kindergarten teacher made the same point. “If they can manipulate that Activeboard and do presentations and do PowerPoints, and create their own documents. . . And then stand there and present it to you with confidence using these things, manipulating them. I think that’s definitely 21st Century.” A possible implication from the quote was students would be ready for life in the 21st century if they possessed those skills. The technology assistant made the point when she noted, “you can offer the kids a lot of hands-on things they can do . . . in the real world.”

The participants in the teacher and assistant focus group extended the concept of exposure by suggesting the technology used at school may have encouraged students to ask their parents to purchase technology for their homes. Technology was, “an investment for them [students] to be exposed to a different type of learning, even for their parents to look at different things.”

As a result of this chance to assist students in widening their vision, “the staff” felt “rejoiceful, feeling that it was going to be great to have the students exposed to all of this. It was going to mean better scoring for the students” (instructional assistant). The instructional assistant brought up two outcomes: exposure for students, and higher academic achievement. The possibility of both these outcomes made teachers feel “rejoiceful” and more likely to implement the model. A classroom teacher and the instructional assistant with whom she worked shared two different stories of young men who found they excelled at

technology. As the young men's confidence grew, they gained more "respect" from their peers and behavior issues began to decrease. Similarly, a first-grade teacher shared that "technology has helped me a lot just to ease their little minds to something better." Students in her classroom were "able to write more because of technology." She commented that, "a lot of students seemed to enjoy learning much better with the technology that was used that hadn't been used before." The principal, a first-grade teacher, and the technology facilitator noted student engagement,

Technology use, "gave the students a chance to get away from pencil and paper. That was a different way of learning for students" (first-grade teacher). The second-grade teacher stated, "I saw children being able to use that software and create things on the computer, learn through the computer much better than they were before. . . It was very neat for them to be able to experience that." Noted indirectly by the second-grade teacher is something the technology facilitator explicitly stated, "we were putting the technology in their [the students'] hands," facilitating "very engaged" students.

Returning to the systemic nature of education, two participants discussed facets of the model that spilled over from students to teachers. Not only did the model hold potential for, "more knowledge for the students, but as well for the faculty" (instructional assistant). The instructional assistant also shared that "children come up sometimes and show me things that I might have forgotten but they know." Another participant believed it was necessary for her to be engaged

in using technology because, “if I’m not engaged in it, and if I don’t enjoy it as a teacher/instructor, the students will not grasp the learning process as well.”

The model provided affective benefits for students, such as exposure to different possibilities for their future, exposure to different ways of learning, all the while engaging students in learning. Students and teachers benefitted from model implementation. These beneficial situations presumably acted as affordances for continued model implementation. There were perceived academic benefits as well.

One case of academic benefits concerned the “learning disabled students. . .in reading” because “they have the cognitive ability to understand something” but “lack actually being able to decode the text, and there’s technological ways to help them get that information that they needed, and they are able to express it in more ways than just writing it down” (teacher-assistant focus group). Additionally, the visual nature of technology also facilitated student learning (technology assistant).

The technology facilitator shared how “scores were up because we were doing those thematic and collaborative units.. . when you do those type of integrative lessons, it does help the kids think.” The IMPACT Model “probably helped facilitate that type of learning. That’s why the scores were probably up then, too because we were collaborating more.” The media coordinator shared, “part of it in theory was if we have all of these things in place, we should see proficiency. If you noticed over the years, that's eroded. We don't have that

proficiency.” Also, over the years, the collaboration has waned (technology facilitator, media coordinator, teacher-assistant focus group) as have the collaborative projects (second-grade, media assistant). And achievement scores have trended downward (state department reports).

The principal shared, “I have to believe our achievement has been impacted, especially in the K-2 grades, because the teachers are getting immediate feedback from using the ActiveVotes.” The model also provided ways to make more data-driven decisions about instruction. “We have data that would help us hone in. Then we have to use that in order for us to become more effective” (media assistant). Teachers reported to the principal growth indicated on assessment reports (principal). Overall, the principal felt it was an, “ideal model because, again, I think of Common Core. I think about how students have to think critically, how they are going to think creatively. I think we can support using the IMPACT Model along with Common Core.” His comment showed support for the model because it can be used to support non-negotiable curriculum goals.

Note how this fed into a comment made by the media coordinator. She discussed justifying expenditures for professional development. The guiding question was “’how does this tie into student achievement?’ If you are at that level, and you don’t understand it, you won’t support it.” While the perception of increased student achievement was discussed among faculty, and may facilitate model implementation, not being able to articulate a connection between model

implementation and increased student achievement may constrain model implementation.

There were other constraints stemming from student use of technology. Using technology at the cost of textbooks and note-taking concerned one instructional assistant. She felt that students did not have materials to take home and study to prepare for test. Her point was, “children learn at different paces. Well, if that’s the case, you’ve got to realize that when it comes down to technology, it’s the same principle. Some children are going to be able to handle learning just strictly putting everything on the ActiveBoard and using the computers. It hinders some of the children, too.” Another aspect of hindering children, particularly the youngest children, was “trying to implement so many different things. . .their minds are so overwhelmed already with all this technology that sometimes I feel like they need to calm” (participant).

The technology assistant discussed how students attempted to abuse access to the Internet by visiting sites not related to school. However, she did not focus on this as a reason to chide children or lock down access, but rather “if they [students] use technology the right way as the powerful learning tool, then if they know how to juggle between the stumbling block part which is, you know, right from wrong. You know things they should not be in, so you can actually be that lawyer” (technology assistant).

Conclusions

Three distinct but overlapping systems constrained and afforded model implementation over the years (see Figure 4). People within each sphere afforded and constrained the model. While the leadership at both the district and school levels created one system that worked to afford and constrain implementation over time, school leadership and faculty created another system, and teachers and students created a third system. A shrinking budget and turn-over were constants within and across all systems (see Figure 5). Without the drive of veteran faculty and the work the principals, the model may not have withstood the challenges created by change.

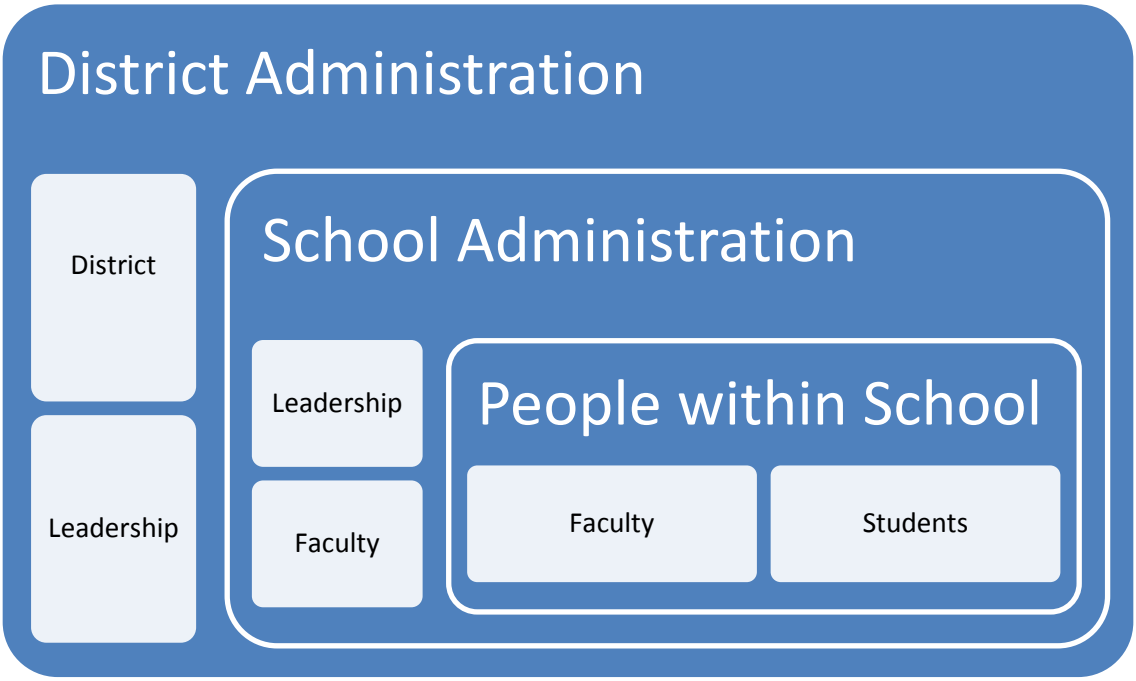

Figure 4. Integration at Basking.

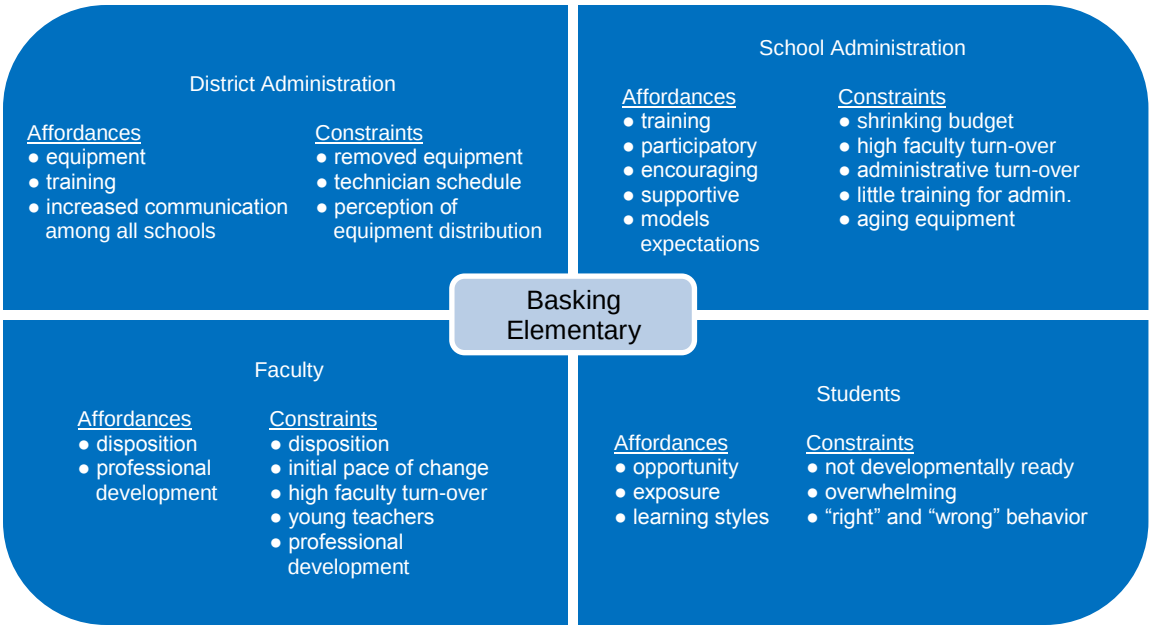

Figure 5. Affordances and Constraints at Basking.

The district-level leadership changed. The position of superintendent changed three times over the years since original implementation. As the FRC commented, what mattered was what was important to the superintendent in particular. As the person in the position changed, the nature of accountability changed as well, reinforcing the systemic nature of leadership in a school district. The federal accountability changed from No Child Left Behind to Race to the Top. Those changes trickled down to state and local education agencies, requiring superintendents to focus on different ways to facilitate teaching and learning. Learning a school-wide model implemented at one elementary school ten years ago may not have been at the top of every superintendent's list. There was a hopefulness that technology integration is important to the current superintendent, perhaps offering more change in the years to come.

The leadership changed. There was much discussion about the first and third principals. While both principals worked to implement the model, resources and circumstances changed over the years. Those changes created a much different situation within which to continue implementing the model.

The faculty and the students changed. The high turnover in teachers and students made it difficult to gauge effectiveness for teachers or students. The most stable population was the instructional assistants, and yet, they did not have many opportunities to facilitate the model beyond their classrooms (media coordinator).

Considering all these obstacles, there were still instructional assistants, classroom teachers, instructional specialists, and administration seeking to implement the model. It is the people who afford and constrain model implementation over the years.

Stories of Sustainability from Trevally

The Story of Buy-in

Trevally Elementary School was located in a rural part of the Southern United States. The school was part of a county-wide district and was one of four schools. There was a school for each of the following grade spans: Pre-Kindergarten-second grade; third through fifth grade; sixth through eighth grade, and ninth through 12th grade. The county had a population of 13,453 in 2010 and 20.6% of the population lived below the poverty level. Agriculture was the main industry in the area, although several participants spoke of students with family

members who traveled to a neighboring state for work. The school system served approximately 1,700 students during the 2011–2012 school year.

Trevally Elementary implemented the IMPACT Model ten years, five principals, and three superintendents ago. The principal at the site during this study was part of the administrative team that advocated for and led implementation of the model. There were still signs in the school designating it as an IMPACT model school. The backbone of the IMPACT model was still implemented. One of the major factors sustaining implementation was the degree of commitment to the model from a range of stakeholders. Not only did faculty and administration at Trevally embrace the model, they worked to sustain the model and facilitate implementation across the district.

The enthusiasm for the model began with administration and the team who developed the proposal. According to one teacher, the administration "bought into it before we did." The commitment developed by the team appeared to motivate the faculty, at least initially. "They presented it as a time of change but that change would impact our students in a positive way. That made it more acceptable for us and made us want to buy into it, too" (teacher). The teacher further stated, "I think that was one of the reasons why it became so successful because they bought into it, the head administration and then our immediate supervisors bought into it." There was a belief that "the hardest thing on the administrators' part was to make sure everybody bought in" and "were on board

and excited about it" (Kindergarten). Apparently, those challenges were met as the model is still widely implemented at Trevally ten years later.

As per the guidelines within the grant, the administration worked to prepare the faculty for change. "We did a lot of training on the change theory and getting people on board" (principal). How such efforts were received was crucial. A Kindergarten teacher also noted that the principal at the time of initial implementation "was probably the key factor in getting everybody on board." She cited his "rapport with the staff" and asking staff members to "go talk to this person. He knew" the people who "need to get on board and make sure that they are buying in because everybody needs to buy in to make it effective." The work of the principal and faculty to prepare for large-scale change and secure commitment from stakeholders within the school facilitated buy-in to the model well beyond the initial years of the IMPACT grant.

Moving beyond the initial site. While commitment to technology integration started at the school-level, district-level stakeholders were soon supportive of the IMPACT model spreading to other schools in the district. A kindergarten teacher explained,

> We wanted our kids not to leave this school and . . . not have the equipment and technology that they were learning on. Our local school board decided each year as those kids that were initially trained on the technology tools, when they moved up to the next year, the local board kicked in money so that we could provide those instructional tools so it would be the same.

The principal gave a similar explanation, with the difference being that school board members began wondering, "what's going to happen to these kids" when they move to the next campus and the "superintendent and our administration at the other schools began to search for extra funding or way of doing things" (principal). In either case, commitment from stakeholders outside the original site and across the entire district allowed the plan for the technology integration to follow the students as they progressed through their K-12 education a reality. According to the principal, "Every single school in our district has embraced [the IMPACT Model] at some level or another."

Collaboration with the other schools was also cited as part of the motivation for the school board to allocate funds for the model to move with students (kindergarten, administrative assistant). For example, the leadership teams from two schools plan together on a regular basis as well as combine faculties for professional development (administrative assistant). Another factor attributed to the buy-in of the school board was the degree to which Trevally utilized the equipment (Kindergarten), and the work the faculty did promoting their work (Kindergarten). The faculty used data collected "about what we liked best so that we would be able to tell our local board and our technology people for the district" (Kindergarten). The school board members also visited the school (Kindergarten). The district was eventually awarded a second IMPACT grant from the state to continue the work of transforming the district to implement the

model. "But the school system had already made a commitment to kind of sustain that, one grade level at a time" (principal).

The way the model spread throughout the county was an indicator of the successful implementation at Trevally. If the implementation had not yielded convincing evidence that technology integration, flexible access to the media center and computer lab, and collaborative planning were not facilitating student learning, there would have been no push and no financial contribution from the district to move the model beyond Trevally. Additionally, moving beyond the initial site helped Trevally sustain their work. The media coordinator stated, "being a district-wide IMPACT, they've been able to pull us along even though. . .I don't know that it would have been that good had the rest of the schools not moved that way right behind us" (media coordinator). Because the model was a district initiative and no longer limited to a single site, the motivation to maintain the model may have increased. Therefore Trevally's work was not done once the faculty and administration initially implemented the model and worked to see it move beyond one campus.

Sustaining initial buy-in. Once the model had been established and embraced by the administration and faculty at Trevally, the focus became sustaining the model. As the principal stated, "We had our paradigm shift, and now we are just really trying to keep up and sustain it." The focus, "as a district" had widened beyond sustaining what was already in place, to "sustaining that ability to adapt." Being able to adapt included,

> looking at ways that we can use new technology tools, funding sources for emerging technologies, training our teachers in new technologies, making sure that we're not getting lost in the shuffle but that we are always staying on that cutting edge and preparing our children for [the] 21st Century (principal).

The focus of the administration at Trevally was sustaining what was in place as well as pushing forward to avoid becoming stagnant. Becoming complacent or accepting their environment as the status quo were ideas the principal and administrative assistant discussed. The principal stated, "We're always looking for what's the next thing. How can we prepare our students? We are always looking for was that we can get better." A first-grade teacher stated, "We have a need to keep it going. Once we've gotten started, we don't want to stop." Another teacher made the comment, "I don't think we've stopped using anything" received during the grant. She also stated, "As a school, when we bit the bullet, we just accepted this is what we're going to do from now on, and we just followed through." In these cases, the teachers have taken ownership of the model and stated their desire to continue implementation.

The administrative assistant took a slightly different approach. She viewed the shift as "the culture of change in the beginning" to being "accustomed" at the time of this study ten years later. "Your view of things, the excitement, the anticipation, obviously isn't there ten years later." However, she also stated that technology sustained excitement and anticipation. "With technology, because it's changing so fast, you still have that." One other difference noted by the administrative assistant was with dwindling financial resources, "you learn to be

excited about those little, teeny pieces and thankful for those little, teeny pieces" of financial support.

Linking these two views about sustaining energy around implementation is an outlook that technology integration at a school-wide level is the new normal. As the work has shifted from implementing to maintaining, and excitement stems from advancements in existing resources rather than novel resources, the IMPACT model is still moving forward. The assistant administrator stated the model "defined what our focus is and what we're committed to doing." That commitment became evident when the grant funding ceased and yet they school "chose to maintain the attitude and the atmosphere, and the focus that we had with the money."

Even after the grant funding ceased, technology funding remained a priority at the district level. The principal and the district technology person "are the ones that actually have the budget and the money to make things happen." (administrative assistant). The administrative assistant, stated "I don't think I've ever been told, 'no. I've always been able to find some money from [the principal] or [the district technology person]" to purchase equipment or software for the school. These statements illustrated the priority of sustaining the model and also the working relationship among the stakeholders. For a request to not be denied, the assistant either stated convincing evidence for expenditures or the requests were closely aligned with what other stakeholders envisioned. Sustaining the

alignment among stakeholders in leadership positions was very likely a result of their shared history of involvement in initial implementation.

The superintendent at the time of the study was an associate superintendent during the initial implementation. Three former faculty members at Trevally , who were all part of the team responsible for securing and leading implementation of the model, advanced to leadership positions. As already stated, the media coordinator at the site became the principal at Trevally. The administrative assistant was the music teacher at the site during initial implementation, and, "second hand to our technology facilitator at the time" (kindergarten teacher). The district's Director of Information Technology was the technology facilitator at Trevally during initial implementation. Leadership had shifted, but not dramatically altered from initial implementation to the time of this study, creating a common history that continued to shape priorities across the district and at Trevally.

This history and the importance of first-hand knowledge was recognized by faculty at Trevally. The administrative assistant was cited as still "really trying to help" with the grant model implementation even though she wears "a lot of other hats" (teacher). The principal was cited as "the anchor" (media coordinator) for seeing changes implemented. She restored the collaborative planning sessions to a full day, which was viewed as "a step forward"(media coordinator). A teacher commented about the principal, "she's very excited about it. I don't think the enthusiasm ever left her." More than any other person, director of

information technology for the district (DIT), was cited for sustaining the model beyond initial implementation. The principal referred to him as, "the driving force in [the county] for technology initiatives." The media coordinator stated that he, "is the one that has made sure it's happened. Of course, he's had the support of the central office staff. "Even though there have been changes at the district level, "he's made sure" to communicate, "this is important. This comes first."

An additional factor sustaining initial buy-in was the lack of turn-over. Of the 26 classroom teachers, 13 were at the site during initial implementation and are still working at Trevally. While key leadership positions have seen turn-over, the principal, school-level technology facilitator, and instructional facilitator retired, only four teachers have relocated and seven teachers retired over the past ten years. With such low turn-over, there were still many faculty members, half of the classroom teachers, involved in initial implementation and continuing to work at Trevally (see Table 6).

Table 6. Trevally Faculty Interviewed/Not Interviewed by Years of Teaching Experience

Teachers Interviewed Ten years	**Teachers Interviewed** **5** years	**Instructional Assistants Interviewed** With Ten or more years	**Teachers Not interviewed** Less than 1 year
13	**0**	**0**	**0**

Affordances

In the case of Trevally, it was necessary to take a more systemic approach to describing the story of implementing and sustaining the IMPACT mode due to the reciprocal nature of influence between Trevally and the local school board. As noted before, the local school board supported efforts to sustain integration well after the model had been implemented and therefore afforded integration through on-going support of technology use at Trevally. The district-level leadership worked with the local school board to move the IMPACT model beyond the initial site to other campuses in the district. Again, the shifting of leadership positions rather than the replacement of leadership at the district level also afforded integration. The current district leaders were steeped in the model and part of initial implementation. The dedication to the model then translated to on-going support as the years passed. However, the work of sustaining the model did not fall only to administration. Teachers worked to integrate technology from year to year and were often motivated by the achievement and enthusiasm of students. Even in the midst of shrinking budgets and professional development challenges, integration of technology was embraced by stakeholders at Trevally and throughout the district over the past ten years.

District-level leadership. In addition to the previous factors, the size of the district also supported successful technology integration. District-level leaders worked very closely with school-level administrators to encourage teachers to integrate. For example, a teacher approached the administrative team member

and requested desk-top computers be removed from her room because they were not being used. The administrative team member complied with the request, but spoke with the principal and a district administrator and asked them both to pay attention to technology integration when next in the teacher's classroom. Both administrators noted less-than-expected levels of integration. After conferencing with the principal and the specialist from the district office, the teacher approached the administrative team member and requested the equipment be placed back in her classroom (administrative team member). Integration was afforded because of communication among school- and district-level leaders and the district-level administrator's willingness and availability to observe classroom teaching.

Fully engaging the IMPACT model was a district expectation (administrative team member, principal, media coordinator). The administrative team member commented, "It's articulated from the top down, the plan for the future." The principal stated that sustainability was a part of their work, "because as a district we are still looking for ways that we can sustain not only former technologies . . . but . . . also looking at ways that we can use new technology tools." She later stated, "it's just a district expectation that we embrace new technologies, that we strive to maintain the progress that we've made in the area of media and technology information skills." She also added, "It's just not negotiable. It's really not." The Administrative team member stated, "It basically defined how the County Schools are going to approach education. It just

changed the face of education for the entire school system." Her statement echoed the principal's statement that, "a big reason why [the model continued] is because that's just the philosophy of our county."

The district also lent monetary support to continue technology integration. The technology facilitator at the county level worked very closely with Title I Coordinator (media coordinator) and the principal (administrative team member) to look for additional ways to fund technology integration efforts across the county. According to the administrative team member, "Individual leaders throughout the school system that believe in it and want it and push for it" and therefore have sustained the model from year to year. Participants (media coordinator, administrative team member, two teachers) expressed a worry that the funding would cease all together and an amazement (media coordinator, administrative team member, principal) that it had not ceased as of the time of this study, ten years after implementation.

In sum, examination of the affordances of technology integration from the district-wide perspective highlighted communication of and work toward a single vision--technology integration. The single constraint at the county-wide administrative level was shrinking budgets. This constraint will be discussed in the next section.

School-level leadership. School-level leadership was the principal and the administrative team member (ATM). The local school board did not allocate funds for an assistant principal, but the ATM functioned as an assistant principal.

Her duties included "technology, instruction, and administrative duties" (principal). There were a few classroom teachers considered school leaders as well, such as one of the Kindergarten teachers in this study. A teacher shared, "As a school, we just accepted this is what we're going to do from now on, and we just followed through." Following through was facilitated by supportive administration and professional development.

The principal at the time of initial implementation was described as being, "right in there with us" and creating an environment such that, "we knew whatever we needed, he was there to try to help us" (Kindergarten). The rapport between the principal and the faculty was cited as one reason the faculty was initially willing to buy into the model and all the changes. A teacher shared, "What I liked best was that they started out with such a positive attitude about it, and asked use to be open and try to have a positive attitude about it, too." The support from administration continued over the years (principal, three teachers). A teacher shared, "It's like we had, not just one person from the schools, you had a support team. If something comes along, you had somebody to go to." She also stated, "Our administration, our principals, and everybody. I think everybody has bought into it. They are willing to support us, each other, in the process of trying to learn how to do it." Another teacher shared, "They haven't left us out there to sink or swim. We know that if we have a need, we can to go them. They are right there. I think that has made it a little easier."

One form of support was professional development (teacher). The administrative team member conducted professional development "throughout the year. . .with teachers and just basically on needs" (teacher). Speaking of the administrative team member and the technology facilitator, one teacher shared, "Another thing I like is that if the need's there, they'll come one-on-one. A need is there, sometimes, and they do. Not just saying it; actually doing it" (teacher).

The professional development accompanying the model, at every stage of implementation, afforded integration. Formal professional development was planned for the year with input from teachers (Kindergarten). However, spoken of most often was informal professional development. "We just learned to lean on each other to help get through whether it was learning something new or just sharing ideas" a first-grade teacher shared. She also stated this type of networking, "may have been mentioned by administration, but I think as a school, we just learned to lean on each other." Teachers shared with one another their areas of expertise. The information was recorded. "As a school, we'd say, 'This hallway, go see this teacher if you have a problem,'" (Kindergarten). Another teacher shared, "somebody knew something you didn't know and would share it. . . .Everybody had something they were pretty good at, so everybody else just pulled from them. That's been okay." Additionally, there were sometimes two different levels of professional development offered to teachers. The media coordinator explained, "We do that with our staff developments. 'Here's iPods, more advanced. Here's the [less advanced] iPods. Where do you need to be?'"

The differentiation allowed faculty to advance at their own pace during professional development.

Teachers and sustainability. Teachers at Trevally were a major portion of the stakeholders responsible for day-to-day implementation of the IMPACT model. The implementation would have certainly stalled had teachers not embraced it and worked to sustain it from year to year. Overall, individual teachers spoke highly of the model and appeared to implement it in their classrooms. Disposition of teachers both afforded and constrained sustainability over the years.

Dispositions sustaining integration. The majority of participants embraced the professional development at the time of initial implementation as well as at the time of the study. A participant shared that although initially she was "very involved . . . because we were having so much staff development" and, "we were very busy. It was exciting because we had all the new pieces."

The IMPACT model kept "teaching exciting because you are always learning how to do new things or a new way to do [some]thing . . . for us to learn different ways to do things" (classroom teacher). Another participant stated what she liked "best" was, "learning how to use all of the different things we had gotten. Going back through all the staff developments and things we had." Yet another classroom teacher stated initial implementation was, "my favorite time of teaching." She continued to say although a down-side to the model was "trying to learn so much at one time, but we loved it" (Kindergarten). Initially teachers were

passionate about the model and worked to implement it. The disposition of teachers was positive, and continued to be overall, despite a great deal of teacher turnover in the past ten years..

Classroom teachers maintained a positive disposition. As a Kindergarten teacher stated, "we are blessed." A teacher stated unequivocally, "I know we're headed in the right direction" with the work underway at the time of the study, "because we are continuing to still use what we have." Note the use of present-tense verbs in both statements. A classroom teacher provided an example of continued use of equipment when she traced the evolution of devices from desktops, then MacBooks, tablets, to iPods over the years. Teachers are now able to access materials stored online during faculty meetings. "Then we can sit right there, and we can look at the PowerPoint while she'd doing it on the big screen. We can follow it right there on our MacBooks. That's been real, real nice."

Another disposition supporting sustainability was the willingness of so many faculty members to work together to implement technology. Out of the thirteen interviews, eight participants spoke about a willingness to work together (principal, five teachers, media coordinator, administrative team member). Even as teachers spoke of the frustration and anxiety of learning so much about the model, hardware, software, and pedagogy all at once, their comments were followed up with positive statements such as a time of "professional growth" (Kindergarten), when teachers "opened their doors" (principal), and felt

"encouragement and support" from working together (teacher). Another teacher shared, a "professional part of the relationships developed from [collaboration]. When I first started teaching, teachers didn't do all that sharing" (teacher).

Implementing the IMPACT model also led teachers to believe the model made a positive difference in their professional lives. A teacher stated, "I have seen the difference in the way I use teaching strategies, and I feel like it has enhanced my teaching" (teacher). A teacher shared that through collaborative planning, "we could praise one another and just get inside each other's heads professionally to see how you think about things and how I think about things" (teacher). The model also gave teachers, "more creative ways to assess kids, also, than just paper and pencil" (teacher). Perhaps the model was supported because, "we had a need to implement different ways of teaching" (focus group). Teachers could also see progress in their work. "I hope we continue in the same . . . path that we are taking right now as far as everything." She also shared, "We've come such a long way with collaboration, planning together, just the whole way we teach now" (focus group).

Teachers also sustained the model for reasons related to their personalities. The word "drive" described the disposition of many participants. One participant simply explained she had "the drive to do it" (teacher). Other teachers were not as explicit. For example, a teacher stated that while she felt out of her "comfort zone . . . at least I would try. They would laugh at me sometimes, but I was trying" (teacher). This teacher also shared, "one time I

would have easily gotten frustrated and just said, 'well, just forget it.' But now, I just try another way." She indicated increased ability and comfort with using technology. Another teacher spoke of being better technology "risk-takers" and an acknowledgment that, "It's been trial and error on my part, as well" (teacher). She also stated, "If I have something, I should be able to use it. I'm sorry if I mess up the computer, but I was just trying to better enhance education" (teacher). All the comments spoke to a comfort with developing another plan and being willing to persevere in the case of setbacks. The media coordinator noted the faculty as a whole was "so willing to try and use stuff. Our staff [stays] on top of everything." Another teacher shared, "This is just so much more exciting, even for me. I've been teaching 25 years" (teacher).

Finally, teachers stated, in different ways, teaching without technology was no longer an option. "As we were able to use pieces daily, weekly, it wasn't this scary item sitting in the middle of the floor" shared one participant. "I can't imagine going backward," stated one teacher. A first-grade teacher shared, "It's made my job a lot easier," and, using technology, "keeps us motivated as teachers to help our students learn." Another teacher stated, "I can't imagine going back to teaching the old way ever again. Another teacher explained, "I don't even know how to teach without it anymore" (teacher). And yet another teacher stated, "It's something that you come in every day, and you turn it on, just like a light switch" (teacher). While "part of every day" may sound passive

and trite, at Trevally, it felt like part of their identity, something of which they were proud.

Constraints

Several factors hindered sustainability, however. Trevally's achievement scores on assessments dropped and the school worked to move out of "corrective action," a condition designated by the state's department of public instruction. Teachers felt not every effort was directed toward implementation. During the focus group a teacher stated, "We've tried a lot of different things, too, to get out of corrective action, so some of the other stuff may have fallen by the wayside." Examining the achievement data for Trevally required a different approach. The students did not take end-of-grade tests. Teachers collected data via running records. Rather than reporting the percentage of students overall who passed the state’s end-of-grade test in reading and math, data was reported in terms of percentage working on grade-level. Additionally, data was reported in terms of the school as a whole meeting standards for growth. While the highest amount of growth occurred early in implementation, it was also during early implementation that Trevally more consistently made adequate yearly progress (AYP). See Table 7.

While turnover was relatively low at Trevally, there were new teachers joining the faculty over the past ten years. The differentiation mentioned in the previous paragraph may have reflected integration efforts with new faculty because they would be able to choose their own entry point into integration

efforts. However, the professional development focused on using tools (two teachers, media coordinator) and not the philosophical underpinnings of the model (teacher) that seemed so motivational to faculty (teacher). Colleagues now have to "make sure that we don't assume that our new teachers, our new staff, know what's here and how to use it" (teacher). There was no mention of making sure new faculty understand *why* the model was in place or how using the model supported learning.

Table 7. Trevally Student Achievement Data

School Year	Performance	Growth	AYP Met
2001-02	60-100 @ grade level	Expected not achieved	Y
2002-03	**Not Reported**	**High growth**	**N**
2003-04	Not Reported	Expected	Y
2004-05	Not Reported	Expected	N
2005-06	60-100 @ grade level	Expected not achieved No recognition	N
2007-08	50-60 @ grade level OR less than 50 @ grade level	Expected not achieved Priority School	N
2008-09	60-80 @ grade level	Expected School of Progress	Y
2009-10	60-80 @ grade level	Expected School of Progress	N
2010-11	60-100 @ grade level	Expected not achieved No Recognition	N
2011-12	60-80 @ grade level	Expected School of Progress	20 0f 21 AMOs (95.2%)

The shrinking budget was mentioned as a hindrance most often at the district- and school-levels (media coordinator, Administrative team member, four teachers). However, this hindrance may be more perceived than real. This is not to say that the budgets allocated to schools were not shrinking. But when discussing funding, two statements were made: Trevally was given less funding for technology (administrative team member), and Trevally was able to purchase what was needed to continue implementation (administrative team member, media coordinator, first). "What was needed" changed over the years. The media coordinator commented that decisions were made about which software subscriptions to maintain. At the same time, the school had been outfitted for wireless Internet access. Desktops in classrooms were aging, while at the same time the school was transitioning from PCs to Macs. The credit for the continued ability to purchase technology was largely given to the district technology facilitator, creative use of existing funding, and seeking additional grants (administrative team member, media coordinator, first grade teacher, Kindergarten teacher, principal).

Although the lack of funding has loomed over Trevally for several years without being a major hindrance to sustainability, the perception may be changing. Teachers were not experiencing the same level of access as during implementation. For example, one participant noted choices had to be made concerning what was fixed when it broke (first-grade), stating, "you have to weigh out your priorities" and "be patient if you need something." Several teachers

discussed frustration with aging equipment. A teacher made the comment, "the computer is supposed to turn on. Well, it's twenty years old. It doesn't turn on." Similar sentiments were expressed in the focus group. A participant shared, "everything at our school is so out of date and broken." Another teacher shared, "Some things are starting to wear. . .but at least you know it's being used" (teacher). As budgets across the state continue to shrink, and Trevally appeared to be facing decisions about equipment and resources, funding may become harder and harder to obtain, more difficult decisions may be in Trevally's future. In light of the budget constraints, the faculty and administration turnover, and professional development, the disposition of teachers figured largely into the success and hindrance of sustainability

Dispositions hindering sustainability. A concern expressed by several teachers was about being outside their "comfort zone." For example, one teacher stated she did not like, "knowing that I had to do something that I didn't feel comfortable doing" (teacher). Another teacher shared, "by the time you could go back to the room and you used it in a lesson plan, we were moving on to something different" (teacher). The rate at which the technology changed contributed to this feeling. A concern of faculty was the rate of innovation and change with the equipment itself. "Because technology changes so fast, about the time you figure out what you think it's doing, we are on to something different" (teacher). Another teacher spoke of a similar concern when she stated that the pace for learning in professional development needed to slow down "a bit."

(teacher). Hesitation or resistance initially could develop into a barrier for sustainability if faculty and staff did not overcome those barriers. For example, one faculty member "will not, will not" utilize her webpage to the level the administrators would like to see, even though she has been on the faculty since initial implementation (ATM).

While several teachers shared the above concerns, there were two additional concerns voiced only by two different individuals. Although hindrances surrounding aging technology have already been discussed, only one participant stated a "fear is to lose all this enthusiasm by not being able to fix what breaks down" (teacher). Note, again, the present tense verbs. The fear was present and close for this participant. A different classroom teacher voiced concern that there was not a balance between "paper/pencil things, which they still needed" and technology (teacher). This theme was echoed in the focus group when a participant stated, "I still think less is more." These statements could be interpreted as concerns about the developmental appropriateness of technology use in primary grades. The principal recalled being asked, "why are you using it at the K-2 level?" while applying for the grant to fund the model initially. It appeared that at least some faculty may not believe a balance has yet been achieved. While dispositions of teachers, their actions and reactions over the years, shaped the on-going implementation, student actions and reactions shaped the sustainability of the IMPACT model as well.

Students and Sustainability. As was the situation with the first case, students were not directly interviewed at Trevally. The comments concerning students were made by the faculty at Trevally. Both affective and academic dimensions of learning were shaped by technology integration, sustaining its use, in most cases.

Work with students sustaining integration. A first-grade teacher succinctly stated four uses of technology that perhaps sustained teachers use over time. She stated technology was placed directly in the hands of students, it was used as a center, it was motivational for students, and using technology created high interest levels among students.

Students may now check out laptops and take them home (Kindergarten). Along with placing the technology directly in students' hands was the concern that resources used by teachers and/or accessed by students were "age-appropriate" (Kindergarten). Recall that the motivation for the school board sustaining technology at Trevally, but also implementing the model in other district schools was to keep technology in the lives of students.

Affective dimensions of student learning were touched by using technology. Behavior issues decreased when technology (teacher), in particular when the Smart Board (Kindergarten), was introduced into the classroom. "[Technology] changed their behavior. It changed their grades. They were excited about it" (Kindergarten). Teachers found students noticed their determination to succeed with the technology and teacher-use of technology became a way to

model determination for students (teacher). A first-grade teacher also noted, "I tackle it with fear. They don't. It's like second-nature to them just to go and use it" (teacher). That observation was echoed by a Kindergarten teacher and the Administrative team member. The ATM noted some children, "don't have a book in their house, but they have an iPod, a laptop, . . .a Wii. It's a necessity to meet them where they are."

Technology integration was sustained through affective outcomes. Several teachers stated they learned about motivating children as part of implementation. The single piece of equipment mentioned most often as a motivator was the Smartboard (four teachers). Not only were students motivated by the technology, but integration of technology, "keeps us motivated as teachers to help our students learn" (first-grade teacher). Tapping into different learning styles may also have been motivating students to learn. A first-grade teacher also shared that using the Smartboard tapped into visual and kinesthetic learning styles. Another teacher took a broader view by describing the faculty as "caring for the students" and being willing to use "as many strategies as it takes to help the child succeed . . . [The model] gives you several choices that you could reach all levels of students and their different learning styles" (teacher). The media coordinator was very excited about the ways using technology made learning fun for students. She praised the faculty for helping students "have fun even if they are teaching the most boring thing in the world and using technology. They are really good at that." The media coordinator added, "Even though they've been

playing with [a piece of technology] for eighteen months, because of technology, there's a new app every day. You can still make it new."

Pedagogically speaking, a teacher and a focus group participant both shared that using technology made it easier to differentiate for students. The IMPACT model "enhanced the way that we taught, the way that we presented lessons, and it was a way to build upon our teaching strategies and be able to reach more kids in a quicker amount of time" (teacher). Using technology also afforded "a wider variety of choices that they could use instead of everything being the same hum-drum" (teacher). Stating, "data has always been a struggle because we are a very, very poor county with a lot of children that come to school with not exposure," the administrative team member followed up by saying, "I have seen that, and teachers have seen that, technology is a necessity." A first-grade teacher used websites and software as a way to activate prior knowledge. At the same time, at least one teacher was sensitive to remaining open to teaching "old school" as well (teacher). Students, "still need manipulatives" and, "It's too easy for them to do stuff with technology, and they can't do it in their head. Like with calculators" (teacher). She summed up her position by stating, "That's why I say with technology as good as it is, these kids still need hands-on."

Teachers felt the technology use now prepared students for their futures. Technology use in school gave students more awareness of the world outside their community , and therefore helped students become "competitive with bigger

counties" (Kindergarten). Another teacher acknowledged her learning curve when she stated, "Now that we know what to do with it, it's able to give our kids experiences they wouldn't get otherwise" (teacher). Being well-versed in 21st Century Skills was another concern for teachers. A second-grade teacher believed being fluent with technology was "like they have to know how to read" because, "absolutely everything is going to technology." A first-grade teacher stated, "they are going to have to learn technology." The focus group participants concluded," It definitely boosted those 21st Century skills." Similarly, teachers believed the knowledge students took with them into college or careers "was a whole lot more than what they would have had without the technology" (Kindergarten). The Administrative team member stated, " Most of all, it's awesome for our kids because they get to learn in an environment more conducive to what they are going to experience as an adult."

Work with students hindering sustainability. The biggest hindrance seemed to be situations that resulted in technology not being in the hands of students. For example, when the teacher in charge of the morning news broadcast left on maternity leave, "it [the equipment] sat there for a while. Her intent was to get it up and running, but then it was so crazy when she came back" that the program never recovered (Kindergarten). There was still a cautiousness of putting the technology directly in the hands of students. A teacher explained that although it was acceptable to let students use the MacBooks issued to teachers, "I don't let mine because I think they are a little

fragile" (teacher). Recall that this particular school is a Kindergarten-Second grade school. The belief that the laptop may not be sturdy enough for young learners may be a reflection of past experience. A first-grade teacher shared that she was "very hesitant" at first, fearing technology might become a replacement for student-teacher interaction. "There's not a replacement that you can have for teacher-student interaction." Despite this reservation, students in her classroom now students can get a laptop, turn it on, turn on the Smartboard and open up online applications (teacher). She did not let her reservations prevent her from integrating technology. Another hindrance, stemming from the focus group discussion, was "there wasn't a structured plan to introduce these computers to these kids. It was just, 'Here's a computer. Here's an iPod. Figure it out.'"

As was the situation with teachers, there was work with students motivating sustainability and there was work with students hindering sustainability. As one teacher explained,

> you go to workshops and there's this new implementation. You come back, and that's what you do, and it kind of fades out here. It fades out there. This hasn't faded out. It's very real. It's very much a necessity for the kids.

Driving the work of teachers is the belief that using technology is necessary for students to be competitive and successful in future work.

Conclusions

Technology integration at Trevally started out with a group of very motivated, very dedicated leaders applying for an opportunity to re-vision

teaching and learning by integrating technology school-wide, restructure the use of the media coordinator and the media center, and provide on-site technical support during the process. While there was initial hesitation on the part of some faculty members, the leadership at the school-level bought into the model and leveraged their beliefs and enthusiasm to garner much support from teachers. As implementation took off, teachers were also motivated by the engagement and academic progress of their students. The school's enthusiasm motivated the local school board to employ the IMPACT model district wide as well as sustain efforts at integration at Trevally. Figure 6 illustrates the nested nature of integration at this site. Beginning with the school level, faculty and students are joined together in the process of teaching and learning all the while integrating technology. At the same time, the teachers work with leaders within the school and within the district to sustain equipment and continue to integrate technology. The school leaders are in turn working with the district leaders and the local school board to support integration efforts to the greatest extent possible.

While there remain pockets of resistance, and/or faculty members who are at different stages of technology use within in their own classrooms, technology use continued to be expected from all teachers at Trevally through the past ten years. Figure 7 illustrates the affordances and constraints at work at this site. In addition, the stability in leadership, at the district and school levels, contributed to sustainability efforts. The small size of the school district also contributed to

sustainability efforts. Even in the midst of shrinking budgets, technology use was still alive and well at Trevally ten years after initial implementation.

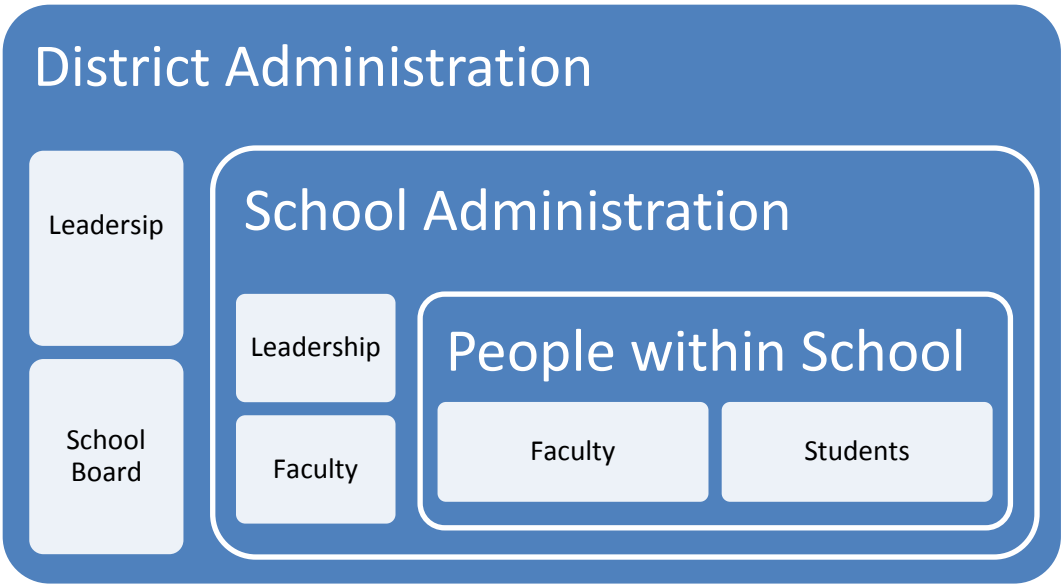

Figure 6. Integration at Trevally.

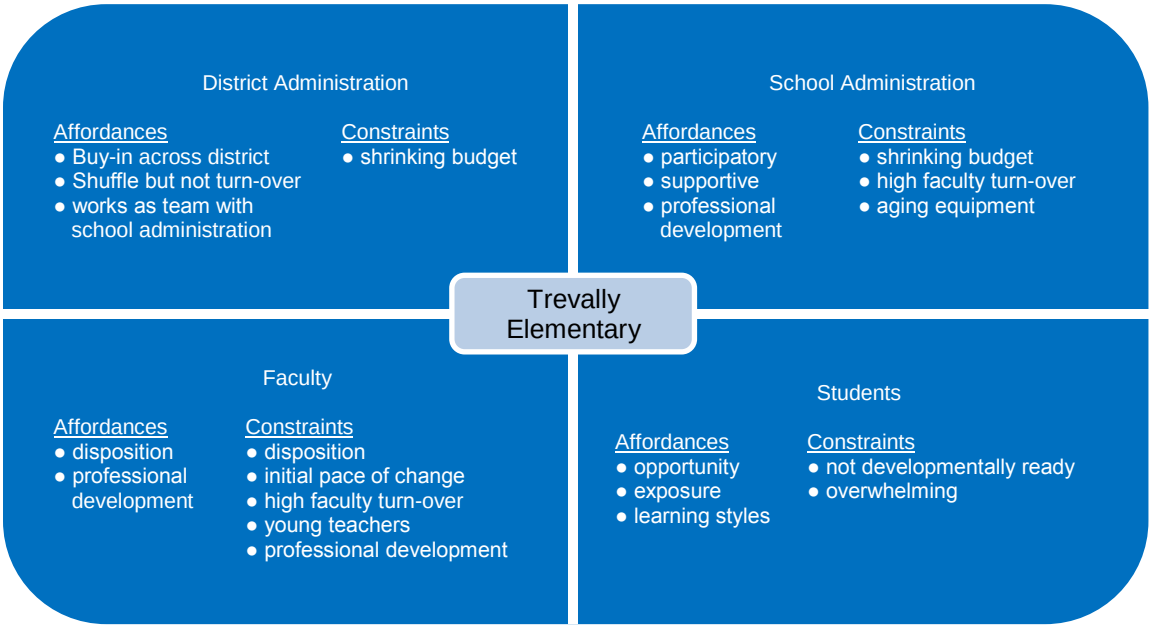

Figure 7. Affordances and Constraints at Trevally.

Shared Stories of Sustainability: A Cross-Case Analysis

The building blocks of the IMPACT model were the same across sites. Trevally and Basking Elementary schools had the same budget allocations for professional development, hardware and software, infrastructure, and personnel. Both schools were required to establish steering committees comprised of faculty positions key to implementation. With these mandates, it would not be surprising that these sites have shared stories of sustainability.

Both sites experienced change at all levels. Superintendents, principals, and teachers changed. Change at the superintendent level was, at the time of the study, working to sustain integration. In Basking's district, the current superintendent was viewed as working to increase access to technology for all students, but not the IMPACT model in particular. In Trevally's district, the current superintendent was associate superintendent when the IMPACT model was originally implemented in the district. He was viewed as understanding the importance of the work Trevally did and willing to support continued implementation of the model.

Change at the teacher level was not working to sustain integration at either site. At both sites, there was no specific plan for helping teachers new to the school understand and implement the model. Both schools did provide professional development on how to use software and hardware, but not on the *why* of integration of technology into pedagogy. It was also noted that teachers on both faculties assumed younger teachers were better at using technology

than veteran teachers and would therefore be more comfortable with change to more technology in the classroom. On the other hand, leadership at both sites stated that young teachers were not always proficient with technology. Interestingly, another similarity was the faculty members who were at the site during implementation bought in to the IMPACT model and remained committed to it, to the degree possible, at both sites. Perhaps veteran teachers were more comfortable with technology over the years than they realized.

Change in funding was also the same at these sites. Across the state, funding for education in general decreased dramatically during the five years previous to the study. Both sites were asked to "do more with less" and often that meant less money for technology upgrades and professional development. However, how the schools responded to decreased funding was different.

Systemic change was the most prominent commonality between the sites. Change shifted practice and culture within the schools. How leadership, teachers, and students responded to change further shaped the culture of the school and both facilitated and constrained integration because all stakeholders filtered changes through their own beliefs and dispositions.

When asked to give three words describing the IMPACT model then and now, there were three answers that were exactly the same at both sites and several responses that were conceptually the same. Similar responses demonstrated a degree of shared experiences among participants at both sites. For example, one participant at both sites stated the model was "wonderful" then

and now. Additionally, two participants at Basking and two at Trevally used the word "collaboration," to describe the model then. Another Basking participant used the term "PLC," which is an acronym for Professional Learning Community. I grouped PLC with the "collaboration" responses because part of being in a learning community is collaborating with other members of the learning community. Participants at both sites stated "flexibility" was part of the model then. Flexibility and collaboration were hallmarks of the integration model. Although each site had the latitude to craft its own implementation, flexibility and collaboration were non-negotiable parts and clearly the grant steering committee, faculty, and staff at the time understood and implemented those pieces at both sites. The foundational pieces of implementation were clearly communicated to stakeholders at both sites.

There were several conceptually similar answers as well, with the majority of similar answers used to describe the model "then." Combined responses included: "scary," "awful," "cumbersome," "pushed," "overwhelming" and like being in a "crash course." These terms communicated a feeling of discomfort. Yet other participants used "intense," "challenging," "a two-edged sword," "involved," "new learning curve," and "apprehensive." These terms communicated a feeling of engagement and anxiety at the same time. The remaining participants used terms such as "cutting edge," "innovative," "exciting" (used by six participants)," "excitement of 'new', "awesome," and, "opened the world." These terms communicated a feeling of positive potential. Examining the

range of responses describing "then" at both sites, the range of human reaction to change became visible.

More conceptually common answers appeared between sites when discussing "then" as opposed to "now." Recall that the building blocks of the model, flexibility and collaboration, were repeated verbatim at both sites for "then." Add the observation that there were more conceptually common terms for "then" as well. During implementation, the two sites were operating under very similar constructs and expectations, of which faculty was very aware. As time progressed and changes occurred, the sites began to differ. Examining how the schools responded to changes and the adjectives concerning "now" highlighted the difficulties of sustaining school-wide technology integration.

Differing Stories of Sustainability

When faced with shrinking budgets, these two schools responded in different ways. Trevally sought grants, partnerships, and district support to continue integration, maintain equipment and professional development. It was no small matter that the technology facilitator for the district was an ardent proponent of the model, working at Trevally during implementation, and subsequently moved to the district-level. From the district level, he worked with Trevally to sustain their efforts. Basking did not have such a knowledgeable advocate working on its behalf at the county level. Basking did have several community partnerships and grants. At Basking their community partnerships were geared toward tutoring and mentoring while the most recent grant was

geared toward a STEM summer camp. The emphasis however, was on the science portion of STEM, not the technology portion. Perhaps due to their designated status of "low performing" and the majority of their students taking standardized end-of-grade tests, Basking felt less able to focus on technology as a way to improve student achievement compared to Trevally, where only one grade level took EOGs. Simply put, perhaps due to external pressure to raise student achievement, Basking felt it necessary to work in other areas besides technology integration.

The differences in sustaining the model evidenced themselves in the conversation about "now." "Now" at Basking there is "no collaboration" and no one used "flexibility" as a descriptor. At Trevally, both "flexibility" and "collaboration" were still given as responses. And yet at both sites the model is still considered "wonderful." Drawing on my previous experience at an IMPACT school during the same time period as Trevally and Basking, the lack of collaboration and the seeming nonexistence of flexibility from participant perspectives demonstrated sustained integration was not at Basking but was at Trevally. For foundational pieces to have collapsed and disappeared from the vocabulary of the faculty indicated that sustaining the IMPACT model at Basking was not a priority over the past ten years. Considering the model was "wonderful" even now, according to a participant at Basking, led to the question, does the participant not recognize the degree to which the model has faded or does the

participant recognize that, all things considered, the model is thriving as well as can be expected?

In examining the descriptors for "now," there was less range in the reactions to current conditions at the time of the study. Participants viewed the IMPACT model implementation as not going as well in previous years, or going well after ten years of implementation. Participants at both sites felt current conditions were "frustrating." One participant at Basking felt the school was *perceived* as continuing to implement the model, when it was not. Another participant at Basking felt the model was "good" but there were "drawbacks." That is similar to the statements made at Trevally that, "less is more" and the model was currently "unstable." Perhaps conceptually related to instability was the recognition at Basking that teachers needed educating about the model as faculty members new to Basking did not appear to fully understand the IMPACT model or their role in sustaining it.

The remaining participants shared positive perceptions, such as, "couldn't go back," "innovative," "life-saver," growth for students," "second nature," and, "opportunities." Interestingly no one on Basking's faculty stated it was used daily. It was as if use was either so taken for granted or not perceived to make a large enough contribution to daily learning and teaching as to be mentioned. However, technology use was observed at Basking. Teachers at Trevally spoke of using the IMPACT model daily during individual interviews and focus groups, and I observed technology being used in some capacity every day I was at Trevally.

Participants at Trevally stated repeatedly that technology was used daily. More teachers at Trevally used more terms with positive connotations then teachers at Basking to describe the state of the model now.

Reflecting on the range of comments, both sites followed a similar path. Initially, teachers and instructional assistants were anxious and/or frustrated and perceived younger teachers to be more comfortable and able to use technology. As faculty and staff participated in professional development and implemented the model, their anxiousness subsided to the point where the use of technology was second-nature. However, many faculty, particularly at Basking, felt the model was now broken and needed attention. Trevally appeared cautiously optimistic that implementation would continue and lead to continued growth, even in the face of uncertain economic times. The source of optimism at Trevally appeared to be continued implementation to this point, plus strong school and district level administration clearly working to sustain integration. Leadership was one of the major factors acting to constrain and afford integration initially and over time.

Similar Affordances and Constraints

Similar affordances. There were not similar affordances noted at the district level. Perhaps this was due to the backgrounds of the superintendents in each district. At the school level, integration was afforded in several similar ways at both sites. The leadership was initially "in the trenches" with the faculty, which proved highly motivational for the faculty and staff. Teachers in leadership roles

at the time of implementation were motivated to continue with the IMPACT model because they saw it "work" with students. The teachers felt their efforts to integrate technology were supported by leadership and by peers, as evidenced by the informal help sessions described at both sites. These experiences, as suggested by Basking's media coordinator, may have formed a deep commitment to the model on the part of teachers and instructional assistants who shared these experiences. Professional development was a major part of sustaining the integration.

Professional development was the area where there was greatest overlap between sites in the affordance of integration. Again, the range of responses from unenthusiastic to committed was recognized. An initial focus on "why" and "how" at both sites made the experiences very frustrating and time consuming. Sessions were also interest/need based, collaborative, conducted by teachers from the faculty at the site, both informal and formal, and "not overwhelming any longer." Participants at both sites discussed how they enjoyed professional development and felt it worthwhile. A cycle of sorts was achieved as most sessions were focused on "how" at the time of the study. Both faculties also noted a need to help teachers new to the profession and new to the site. Over time, professional development was a key piece for facilitating integration at both sites. To some degree, teacher dispositions played a role in the success of professional development.

At both sites, participants stated that people were willing to help one another and share information with each other. Initially, faculty and staff were willing to work after hours and driven to see the model work. Many faculty members at both sites were motivated by children's reactions and engagement with tasks, perhaps creating a desire on the educator's part to continue to use technology, which in turn led to the statements about being second nature and using technology daily. These aspects of the teachers' dispositions worked to facilitate integration as did teachers' perceptions of how technology helped students.

Students at both sites were described as engaged in learning tasks, motivated to learn, and comfortable with technology. Teachers felt technology use now would open up more opportunities to students in their future. Both sites stated technology should be in the hands of students and therefore offered more ways for teachers to assess student progress. These factors, from district to student, afforded integration over time at both sites. There were also similar factors that constrained integration.

Similar constraints. The similarities at the district level are the same as discussed in the section concerning stories of sustainability and can be summarized with one word: change. However, the similarity stopped there for district level comparisons. At the school level, both faculties experienced teacher turnover. Turnover rate acted as a constraint because the new faculty members were not typically given any background about the IMPACT model nor were they

assisted in how to integrate technology to the same degree as veteran faculty members. The result was waning implementation. Additionally, aging equipment frustrated faculty at both sites.

Considering the requirements of the grant, it may be no surprise that the majority of similarities revolved around professional development. Due to the systemic nature of education, it is probably not surprising that change was also a common factor. However, there were significant differences between the two sites.

Differences Affording and Constraining Sustainability

The differences at both sites led to different outcomes. What was an affordance at Trevally may have been a constraint at Basking, and vice/versa. For this reason, the following section is organized by role within the system as the priority rather than by similarity or difference.

Leadership was the most striking difference between the two schools. Over time the leadership at Basking was replaced. The leadership at the time of the study, the principal, assistant principal, and superintendent were not at all involved in implementation nor did they receive professional development regarding the model. The principal worked to educate himself about the model and sought support from teacher-leaders who were well versed in the model. However, the level of commitment would be difficult to match with Trevally, where both administrators had ushered the IMPACT model in and worked to sustain it for ten years. The administrators at Trevally were heavily invested in seeing the

IMPACT model continue. Leadership at Trevally, as well by the superintendent and the county-level technology facilitator, had shifted but maintained personal knowledgeable of and committed to the model in leadership roles for the past ten years. Another leadership difference, resulting from shifting teacher leaders from Trevally into more formal leadership roles, was that administration has a long history within the site itself. This was different at Basking where, although the principal worked within the same school system, he had not previously worked with faculty members from Basking.

Within each school, differences stemming from leadership were also manifest. Primarily, the steering committee mandated as part of the IMPACT grant was still fully functioning at Trevally and not operating at all at Basking. Perhaps the steering committee situation could be a mirror to how leadership over all operated. The principal at Basking realized he was not at full implementation, but believed the IMPACT model held promise for helping students and teachers. Ultimately he felt constrained by shrinking budgets and mandates for improving achievement. The principal at Trevally realized she was not at full implementation, but was satisfied that implementation was the best it could be under the current conditions. As a further example, Basking was not as collaborative as it once was, whereas Trevally prided itself on a renewed commitment to collaboration among faculty.

Teacher dispositions were similar to leadership dispositions. At Basking, teachers were frustrated that they seemed to be an IMPACT Model School in

name only and were frustrated with how the role of the media center had changed over time. Perhaps most frustrating to the Basking faculty, the principal included, was the loss of the school-based technician and the resulting lack of timely repairs. On the other hand, Trevally's teachers were satisfied with the leadership and the progression of the model. The worry spoken of most often at Trevally was how to continue funding innovations.

In sum, these two sites offered a unique opportunity to examine the state of a school-wide technology integration ten years after original implementation. Comparing the level of implementation now, in light of state, district, and site specific changes, it appeared that committed, knowledgeable leadership, ongoing high-quality professional development, and professionals committed to the IMPACT model were key to sustaining integration.

CHAPTER V

INTERPRETATION OF FINDINGS

These two stories of sustainability, once barriers of access, support, and resources were minimized, revealed points of divergence. At Basking, first-order (external) changes in personnel and lack of on-going professional development worked to undermine sustainability. High turn-over among teachers and administration made it difficult for a deep understanding of the IMPACT model to be sustained throughout the school over time. Professional development took a similar trajectory. Initially professional development was designed to teach participants how to use software, hardware, and to build the pedagogical underpinnings of the model. At the time of this study (10 years after the original IMPACT model began), professional development was mostly about how to use hardware and software, but not about how to integrate or use technology as a tool for teaching and learning. New faculty members at both sites were given little, if any, professional development concerning how to implement or sustain the original goals of the IMPACT model. Additionally, cessation of funding at both sites made these two things difficult to address, and compounded the burden of maintaining aging equipment. While three first-order barriers—turnover, professional development, and little funding—were observed at both Trevally and Basking, the response to these situations was different between the two sites.

Trevally did not experience teacher-turnover rates as high as Basking's rate. The administration and majority of the faculty remained committed to the IMPACT model, and they were present during the initial professional development 10 years ago. Stability arose from this shared history and a strong initial "buy in" among original participants who are still at Trevally. In other words, second-order barriers were minimal at Trevally. Additionally, administration at Trevally sought grants to supplement funding that had waned, in effect working to minimize first-order barriers as well. Basking did not benefit from their shared experiences to the degree Trevally did, in part because of turnover at the administrative level as well as the faculty at Basking.

In sum, the affordances and constraints at both schools were influenced by people and funding, both of which were first-order barriers. People working across the school system and beyond, in the case of external funding decisions, afforded and constrained the model's sustainability. The stories most stakeholders expressed were about a desire to facilitate the model on an on-going basis, while still voicing their concerns and explaining obstacles they encountered, as will be discussed in more detail below. These stories resonated with the concept of comprehensive school reform.

IMPACT as a Comprehensive School Reform Effort

Aladjem and Le Floch (2006) conducted a meta-analysis to describe the lifecycle of comprehensive school reform (CSR). They began by explaining how they define the term comprehensive school reform by maintaining, "In all cases of

substantive school-level change, school leadership and faculty must go through reform initiation, professional development and implementation" even if the process is not formally labeled as Comprehensive School Reform (p. 235). Under their definition, the IMPACT model would be viewed as a CRS model. As such, conclusions about CRS may be applied to IMPACT schools. One conclusion Aladjem and Le Floch (2006) reached was, "establishing ongoing teacher and principal investment in and ownership of the CSR process have become essential to implementation" (p. 236). This was observed at both sites, but in different extremes. At Basking, the ongoing investment and ownership was thwarted by turnover, for example. As Taylor (2006) found,

> unexpectedly, teacher turnover turned out to be a more important factor than district policy or district leadership turnover. This finding highlighted the difficulty of sustaining a reform effort when the teachers who initially bought into the reform depart and new teachers join the school, necessitating constant training and retraining of the fundamental implementers of the reform (p. 342).

Taylor also found that more than one factor worked "in combination or cumulatively" to sustain a reform (p. 342). As evidence of this, Taylor (2006) explained, “Resolving faculty retention issues and providing professional development supports for the CSR effort appear to be the most significant of this interrelated set of sustainability factors" (p. 346). The same set of "interrelated set of sustainability factors" were voiced and observed at both sites and proved to be much more difficult issues for Basking, where the teachers were new to the site and often new to the profession as well.

Of interest for this study were the findings that "restructured schools will have to take the political initiative to challenge and push the system around them to change in order to survive and thrive in the long run" (p. 291). Trevally was able to accomplish just this by communicating their successes and advocating for the model with the local school board.

Another aspect of CSR linked to sustainability observed at both sites and discussed in the literature was funding. Several studies indicated that it was necessary to plan for funding even before implementation (Datnow, 2005; Hsu & Sharma, 2010; Taylor, 2006). Lack of funding was certainly a concern at both sites. However, Trevally appeared to have a better plan in place for maintaining funding even in the face of shrinking budgets. Part of their plan was put into place early in the implementation of the IMPACT model and included garnering support from the local school board. Trevally also may have been able to leverage support from the local school board due to the small size of the district exerting pressure on the board to be equitable in resource distribution across the district as all students attended the same middle and high school. Such concerns were neither voiced, nor was such an approach in place at Basking. Basking was also part of a much larger school district than Trevally.

Leadership is a critical aspect of both CSR and technology integration, and it is linked to sustainability as well (Friday Institute, 2011). The aspects of leadership and technology integration found in the literature were reported at implementation at both sites, but each was not observable at both sites.

Leadership at both schools then and now set and communicated clear expectations and worked with others (Baylor & Ritchie, 2002; Hadjithoma & Karagiorgi, 2009; Schrum & Levin, 2009). It was interesting that even though the steering committee for the model had essentially been dissolved at Basking, the principal sought out knowledgeable faculty members to aid his efforts to continue the IMPACT model. Bigger discrepancies were in the area of providing support for change (Baylor & Ritchie, 2002; Hadjithoma & Karagiorgi, 2009). Both sites faced shrinking state-level budgets as well as reduced technical support, hampering efforts to support change. Additionally, by the time the current leadership was working at both schools, it was not so much supporting change as it was supporting continued implementation. Again, the role of context, particularly district size, presented both sites with different options to sustain the IMPACT model. Whereas Basking was part of a larger system, it was more difficult to sustain the work of the model within one school. Trevally on the other hand, was able to leverage continued support by advocating for the IMPACT model and seeing it spread through their smaller district.

Stories of Sustainability

Stories of sustainability can be partially understood in light of the comprehensive school reform. However, such connections are not meant to imply there is a list of steps to check off in order to sustain technology integration. According to West, Ainscow, and Stanford (2005), such a view "underestimates the social nature of the way practice evolves in particular schools, in particular

contexts, and at particular times" (p. 80). Several studies stated in order to understand integration, but not specifically sustainability, it was necessary to understand teacher beliefs (Ertmer, Addison, Lane, Ross, & Woods, 1999; Ertmer, 2005; Ertmer, Ottenbreit-Leftwhich, Sadik, Sendurur & Sendurur, 2012; Hew & Brush, 2007). Exploring the social nature of change acknowledges dynamics such as culture, in terms of leadership, and beliefs at work across levels of the education process as well as among stakeholders within each level.

Sustainability and Social Nature of Change

Concerning the literature on sustaining technology integration in particular, there is little data discussing school culture and teacher beliefs, a second-order barrier or facilitator. Most data concerning school culture and teacher beliefs is embedded in the context of integration (Herr & Brooks, 2003; Hew & Brush, 2007; Kopcha, 2012; Sugar & Kester, 2007) not sustainability. A single study was found with the word sustainability in the title. However, the technology initiatives under study, all funded with grant money, had a lifespan of one to three years and were not discussed in terms of viability after the grant funding ceased (Herr & Brooks, 2003). However, there were several studies concerning sustainability, school culture, and teacher beliefs, and non-technology related reforms.

For example, West, Ainscow, and Stanford (2005) found that for school improvement to be sustained, leadership at the school level felt that the school's culture and leadership must change. "They [school leaders] mainly described this in terms of changing values and beliefs" (p. 83) to sustain the implemented

changes. Teachers at both sites stated that their practice had changed over time to the point that technology use was a taken-for-granted aspect of their practice now. Several teachers stated that they had overcome their fear of using technology to the point they could not teach without it now. Datnow (2005) found that in schools with sustained reforms, the reform was "an obvious feature of the structure and culture of the school" (p. 135). Particularly initially at Basking and continuously, although to varying degrees, at Trevally, the IMPACT Model structured the school. The media center was the hub of school activity and collaboration among grade levels, the media coordinator, and the technology facilitator were expected and practiced. Even down to banners and plaques, these sites were identified as IMPACT Model schools. Moffett (2000) stated that the culture of the school and district had to be positive to sustain change. Positive culture took on an interesting perspective in the cases of Trevally and Basking. In the initial implementation, the leadership at the district level was supportive and the leadership at the school level was very involved in training and implementation, which created much positive energy among the faculties. At the time of this study, Trevally retained a knowledgeable champion committed to maintaining the progress over the past ten years and moving forward. Basking, while not having a negative culture, faced more foundational challenges such as high-teacher turnover, leadership that was an enthusiastic champion of technology use in general, and mandates placed on the school from the state level.

A study of inclusion practices at a middle school in Florida mirrored almost exactly the trajectory of Basking (Sindelar, Shearer, Yendol-Hoppey, & Lieber, 2006). The middle school study found that after an initial period of successful implementation, concluding in 1996, changes were not sustained from 1998-2002. Factors attributed to programmatic erosion were changes in leadership, key players being assigned other duties that took support away from the original program goals, state policy changes producing more pressure on administration and faculty to increase student achievement, teacher turnover, and reduced support for the program. Each one of these factors was also at work at Basking, resulting in the same outcome—erosion of the IMPACT model after a period of successful implementation.

Sustainability and Institutionalization

There were two terms used to discuss the stages of reform beyond implementation--sustainability and institutionalization. In the research literature on institutional change, Datnow (2005) suggested that institutionalization was used during the 1980s while sustainability has been used more recently. However, Datnow (2005) also explored how the two terms were linked, therefore making it difficult to separate the terms in a discussion of sustainability. Billig, Sherry and Havelock (2005) favored the term institutionalization, although they also suggested sustainability was a closely-related term. In either case, both of these studies resonated with my findings at Basking and Trevally.

Datnow (2005) linked institutionalization and sustainability stating that "for a reform to be sustained, it must become institutionalized. So too, when a reform is institutionalized, it has been sustained over time" (p. 123). Datnow (2005) claimed that a reform was institutionalized when it became "a taken-for-granted feature of life in a school" or lost its "special project status" (p. 123). Reaching that point involved "a multilevel process of embedding an innovation in the structure and norms of the organization" (p. 123). While both sites still identified themselves at IMPACT Model Schools on banners or plaques displayed in the school, and participants at both sites stated that the technology was taken-for-granted. For example, one participant at Basking stated that although the title was still there, they were not functioning as an IMPACT school. In the case of Basking, losing special project status may have been a positive sign, as it was for Trevally, but as the IMPAPCT model eroded, the designation became hollow and a marker of how "broken" the model had become at both schools. Relatedly, Anderson and Stiegelbauer (1994) noted the systemic nature of institutionalization in part because of "ties between classrooms, schools, and the district office" as well as the observation that "some parts of a change may get continued while others do not" (p. 280). The last statement resonates with other literature on CSR life cycles (Aladjem and Le Floch, 2006) as well as observations made at Basking that the model was "eroding" rather than ceasing to exist. Anderson and Stiegelbauer (1994) also found that "routinization was accompanied by feelings of complacency and lack of continued professional

growth" (p. 289), which matched the perspectives at Basking, demonstrating that becoming routinized or institutionalized may not be indicators of sustainability.

Datnow (2005) also found changes were sustained for "8 or more years" when the interactions between "change processes" such as "political support", and how well the reform fit into the local culture, were attended to by schools (p. 124). She noted a concise list of factors leading to sustainability found in the research literature included: "genuine interest in change, teacher and administrator support, a critical mass involved in implementation, sustained professional development, and a practical plan for implementation and monitoring of the change effort (Anderson & Stiegelbauer, 1994; Moffett, 2000)." All of these factors were observed at both sites. The practical plan for implementation was part of the grant proposal while the plan for monitoring was addressed by the writers of the grant. Outside evaluators were hired for the initial four years of implementation. However, beyond those four years, monitoring became the responsibility of the site and district, outside of reports about the library/media center required by the state department of public instruction. However, these factors were internal to sustainability, and therefore only told a partial tale.

While Datnow explored sustainability and institutionalization, her 2005 study mainly focused on external factors influencing sustainability. She found that "shifting contextual conditions", including state and district decisions and mandates, "brought about whether and how to sustain reforms" (p. 135). She

reached the conclusion that "Reform sustainability or expiration did not result from individuals or institutions acting in isolation from one another. Forces at the state, district, design team, schools, and classroom level all interacted to shape the longevity of reform." Considering her findings, first- and second-order barriers work in concert to hinder or facilitate reform. Datnow also found, as Cuban (1986) and Ertmer (2005) did at the classroom level, reforms were more likely to be sustained if they "helped educators meet new local and district state demands, or at least did not come into conflict with them." (Datnow, 2005, p. 146). Relevant to this study, teachers at Trevally worked to use technology to deliver a writing assessment while I was on-site. Teachers used the interactive whiteboard and a web-based service to read a book to the class and then deliver a text that was the basis for the writing prompt. Nevertheless, teachers had mixed reactions to using the technology to read to the class. A teacher stated that she used Tumble Books to read the book to the class to prepare for the writing assignment and made no further comment about the process. A second teacher stated she used the Tumble Books book as well as a hard copy. She felt she could present the text "more smoothly" to students when reading from a hard copy and that there was "no replacing" the teacher-student interaction.

A second implication from Datnow's study related to this study was that the more demanding a reform was of resources and existing systems, the more difficult it was to sustain. That is, it was "vital to establish a stable resource base that can last through leadership and political changes" (p. 147). Consider again

the role the leadership of both schools had in original implementation. The principal at Trevally who had more history with and investment in the IMPACT model worked to sustain it from a more knowledgeable perspective than the principal at Basking who did not have the same opportunities to participate in the original IMPACT model training.

The third connection to current research on sustaining innovations was also observed at both schools ten years after the origination of the IMPACT model. That is, ". . . a high-stakes accountability system may inhibit the sustainability of reform efforts in schools, particularly in schools that do not exhibit high capacity (and high-achievement levels and good reputations with the district) before the introduction of such a system." (p. 147). During the focus group, teachers at Trevally discussed how pieces of the IMPACT model were not focused on while working to improve their school designation from "low performing." This is one example of the influence of high-stakes testing on a school's ability to sustain previous innovations.

Recall Billig's framework (2002) presented in Chapter 2 that included nine factors for sustainability of an innovation studied by Billig, Sherry, and Havelock in 2005. The purpose of the Billig et al. (2005) study was to determine which, if any, of the nine factors were key for "ensuring technology infusion over time" (p. 989). Billig et al. (2005) found some, but not all, of the framework features to be crucial for sustainability. Leadership, in particular, support from local administration was vital if change was to be school-wide; infrastructure, in terms

of people; funding; "Transformed cultural climate;" "Incentive and empowerment;" and, proof the project was viable. These were present at Trevally more so than Basking. For example, the local administrative support at Trevally was part of the original implementation team for the IMPACT model. In other words, the leadership team established at the outset of the IMPACT model was still viable and visible at Trevally, but not at Basking. Recall the administrative assistant's statement that she had never been told "no" when asking for hardware or software. That particular statement may come from a feeling of empowerment, cultivated by supportive district leadership. The remaining factors from Billig's (2002) framework not particular to technology innovations, including support structures, visibility, partnerships, and funding also were more present at Trevally than at Basking as well. For example, efforts to promote the IMPACT model within the district made their successes visible and increased support structures and funding for the school. Basking, however, did not have such success promoting their work and did not have the continued strong support from the district level.

Also related to the findings of this study, Hsu and Sharma (2010) delineated a framework for sustaining involving "people, process activities, and systems" (p. 46). Important to note is that their work was based on a review of existing frameworks "as well as supplemental findings" from a research study (p. 41) from the perspective of planning for sustainability rather than examining existing programs or innovations that had been sustained for a period of time.

The term "people" was defined from an aggregate point of view and did not include the students. For example, the MTAC committee required as part of the IMPACT model would be an example of "people" according to Hsu and Sharma (2010). Hsu and Sharma, citing Lambert (2002) reiterated that without support from people like classroom teachers, the principal is not likely to accomplish substantive change, a stance the principal of Basking and the administrative assistant at Trevally also voiced. Hsu and Sharma also advocated collaboration as a tool vital to integration during the change process. In this study, collaboration was a tool that was used to varying degrees at both schools. The "Process Activities" that Hsu and Sharma outlined related to the work of integrating technology. For example, adopting pedagogical strategies and research-based practices would be part of Process Activities. Hsu and Sharma suggested that one way to bring about sustained integration was to include "people who take the role of researcher and practitioners" while implementing research-based practices (p. 51). In this way "mechanisms for people to interact with a hierarchy of educational systems" (p. 50) would also be provided, leading to increased likelihood of sustainability. Basking, being part of a larger district, may have had to contend with several layers of bureaucracy that may not have existed in Trevally's district. Where Trevally was the school in its district with serving the PreK-2 grade span, Basking was one of several elementary schools within the district. In turn, it may have been more difficult for Basking to interact

within the hierarchy of their district than for Trevally which may have in turn led to erosion of the model.

Another part of the system needed for sustainability involving people, and a key part of sustained technology integration, was professional development. Lawless and Pellegrino (2007) discussed the "design-based approach" to professional development, which was used at both Trevally and Basking. In this approach, professional development was situated in the context of curricular needs while introducing teachers to new technology. The results of taking a design-based approach to professional development noted by Lawless and Pellegrino were observed at both sites: teachers taking ownership of resources, developing confidence in technology integration, and reflecting on practice. For example teachers took "more ownership of the resources" (Lawless & Pellegrino, 2007, p. 594) at Basking. Recall that the media coordinator was "not allowed" to discard old equipment due to its provenance. Teachers at Basking also developed "higher confidence in integrating" technology as a teaching tool and believed "curriculum resources will have a positive impact on student achievement" (Lawless & Pellegrino, 2007, pg. 594). Teachers at Trevally discussed how early in implementation they were afraid of the technology, but now felt they could not teach without it. Teachers at Basking discussed the journals they were required to keep in the early stages of implementation. Perhaps the ultimate outcome from this approach, also at both schools, was that "communities of colleagues within and across school settings that will sustain the

efforts long after the conclusion of the training" (p. 594). By situating the professional development surrounding implementation, it appeared that Lawless and Pellegrino were correct—long after training had concluded, communities of colleagues were still working to sustain the model.

Implications

The implications of this study are of interest primarily for policy makers, district- and school-level administrators. These particular stakeholders are positions within the system to plan for sustainability.

Implications for Policy Makers

Policy makers considering supporting school- or district-wide technology integration projects may benefit from considering several implications from this study. First, whatever integration projects are being considered, making long-range plans for sustained funding is crucial. Clearly communicating the benefits of the model to stakeholders at various levels of the educational system may help sustain the program as well. Publicizing success may also help attain additional funding if a track record of successes could be demonstrated. Second, positive, supportive leaders who practice distributed leadership and clearly understand the initiative and are committed to it are critical. Third, sustained professional development during initial implementation as well as ongoing for new faculty members is critical to sustainability. As Basking's Media Coordinator suggested, at the very least administration needs to be well-versed in the vision and mission of the initiative

Implications for District- and School-level Administrators

People and funding are key. Knowledgeable, committed champions of the initiative are vital to sustained implementation. Leadership at the school level, attuned to the culture of the school, with a vision that is clearly shared with and shaped by the faculty are needed to sustain buy-in. Part of that vision should account for decreases in initial funding. Mechanisms for seeking funding, such as a grant-writing committee, may also be necessary. An additional part of the vision for any initiative should include how to overcome the detrimental effects of teacher and administrative turnover at the school.

The Friday Institute (2011) compiled a list of recommendations for implementing a 1:1 laptop project. These recommendations would also serve well as considerations for sustaining initiatives as well. The recommendations are:

- Develop a thorough implementation plan and train teachers before distributing digital devices;
- Ascertain that the school or district has the appropriate technological and leadership infrastructures to run the program;
- Secure strong buy-in from all stakeholders, including district and school leadership, teachers, students, parents, and the community;
- Construct a leadership team with an eye toward members who will commit long-term to the initiative and support it;

• Provide continuous professional development that is aligned with teacher needs;

• Ensure continuous availability of efficient technical and instructional support personnel;

• Enact policies for the appropriate use of digital devices and resources; and

• Use data from project evaluations to inform and improve future program decisions. (p. 15).

These recommendations were outlined in the original RFP for the IMPACT grants. As these features faded away, as in the case of Basking, or largely remained, as in the case of Trevally, schools experienced different levels of sustainability.

Limitations

There are several limitations to this study. First, this study was not longitudinal. Hew and Brush (2007) maintained that longitudinal studies were important for technology integration research. Longitudinal studies provide extended time to observe interactions, between types of barriers, to observe strategies at work, and changes over time (Hew and Brush, 2007). The study was also not retrospective. There were evaluation reports written about these sites from the beginning of the grant cycle. However, a condition of collecting the data was that data identifying specific IMPACT model schools would not be

released. Therefore, I could not use these data and be certain that the schools discussed were the schools I was studying.

Because of prior experience with model, I may bring personal biases into study. However, my experience with the IMPACT model, beginning with the first year the grant was awarded and continuing through this study, gave me unique insight into the process of the grant. I was able to more finely tune my follow-up questions, be better attuned to relationships among faculty and staff, and better understand the experiences of participants. Nevertheless, to minimize bringing my biases based on my experiences with the IMPACT model as implemented at the site where I work, I kept a researcher journal.

The time of year data collected could have been a limitation. I visited both sites late in the academic year. At Basking, fifth-grade students were preparing to take a content area end-of-grade test. Such preparation, I believe, limited the amount of regular instruction observable in fifth grade during my visit. Also, my visit to both sites was announced to the faculty on the morning of my arrival. While such an announcement may have stressed some participants, waiting to announce my visit did not allow time for teachers to alter lesson plans if they would have been so inclined.

Future Research

Future research in the short term could include studying the additional two sites who met the same criteria as the two sites chosen for this study to allow further cross-case analysis. Additionally, examining how student achievement

levels during the first years of implementation compared to later years of implementation may provide further evidence to consider when considering such reforms.

As many of these findings were found to replicate previous work, and significantly older work at that, perhaps it is time to consider studying more specifically the affordances and constraints to implementing what research has shown to work in actual longitudinal studies.

Interviewees at both sites also discussed age of teachers as it related to technology integration. The administration quickly pointed out that new teachers—new to the field and new to the site—did not feel as comfortable with using technology as the administration assumed they would. Additionally, the teachers interviewed spoke of how grateful they were to have young teachers on the faculty who knew how to work the technology and were willing to help the veteran teachers. Exploring the paradox of perceptions may yield some information about what schools of education can do to help new teachers be better prepared for the schools and classrooms they enter.

Conclusions

Stories of sustainability presented an interesting portrait of what it was like to sustain an initiative when traditional obstacles to implementation were minimized. Over time, some obstacles resurfaced. While hardware and other equipment were still new and cutting edge, and while there was still an on-site technician to support its use, teachers were mostly enthusiastic about technology

integration. Hardware was not an obstacle. However, over time and as funding dwindled to a stop, hardware has become an obstacle. With no on-site help and with the equipment aging, enthusiasm for use was replaced by worry about balancing use and maintenance. That scenario of minimized barriers becoming bigger obstacles over time is the story of sustainability. The response of leadership to these new obstacles is the story of affordances and constraints of technology integration.

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APPENDIX A

INTERVIEW PROTOCOL

Individual Interview Questions

1. How many years were you at this school before (or during) the IMPACT Model?

2. NCDPI awarded your school more money after the initial grant funding. Why do you think your school received this additional funding?

3. What are three words you would use to describe IMPACT then (first four years)? Why?

4. What are three words you would use to describe IMPACT now (past 4 years)? Why?
   a. What caused the difference? OR What/who caused the continuity?

5. What did you like best about IMPACT during the initial implementation?
   a. Is that still a part of this school/your teaching?
   b. What or who sustained/developed that feature?

6. What did you like least about IMPACT during the initial implementation?
   a. Is that still a part of this school/your teaching?
   b. What or who sustained/minimized that feature?

APPENDIX B

FOCUS GROUP PROTOCOL

Focus Group Questions

1. NCDPI awarded your school more money after the initial grant funding. Why do you think your school received this additional funding?

2. In what ways do you think was IMPACT successful at your school? Not so successful?

3. What has happened at this school since the IMPACT grant was implemented?
   a. Lessons learned?
   b. Successes celebrated?
   c. Changes?

4. What impact has IMPACT had on your school?
   a. Policies?
   b. Leadership?
   c. Decision-making?
   d. Student outcomes?
   e. Teacher outcomes?
   f. Relationships with other schools? The district?

5. Do you view the IMPACT model as a viable model now? Why?

APPENDIX C

WALK-THROUGH OBSERVATION PROTOCOL

Walk-Through Observation Protocol

____Lesson Objective

____Instructional Methodology Used

____Level of mental engagement required of students

____Evidence of instructional support on the classroom walls.

____What technology is in classroom

____Technology being used in the classroom
By whom?
How many students?

____Evidence that technology was/is used with students
student comfort level/ease of use
evidence of routine(s)
clickers at/in desks

First four items from:

Bushman, J. (2006). Teachers as walk-through partners. *Improving Professional Practice, 63*(6), 58–61.

Last three items from IMPACT observation sheets/previous field experiences/ literature