Framing Innovation: Do Professional Learning Communities Influence Acceptance of Large-Scale Technology Initiatives?

Authors: Anna Patricia Nolin, Erik Paul Arnold, Peter D. Cohen, Gina Eva Flanagan, Henry J. Turner

Persistent link: http://hdl.handle.net/2345/3832

This work is posted on eScholarship@BC, Boston College University Libraries.

Boston College Electronic Thesis or Dissertation, 2014

Copyright is held by the author, with all rights reserved, unless otherwise noted.
FRAMING INNOVATION: DO PROFESSIONAL LEARNING COMMUNITIES INFLUENCE ACCEPTANCE OF LARGE-SCALE TECHNOLOGY INITIATIVES?

Dissertation in Practice
by

ANNA P. NOLIN

with Erik P. Arnold, Peter D. Cohen, Gina E. Flanagan, and Henry J. Turner

submitted in partial fulfillment
of the requirements for the degree of
Doctor of Education

May 2014
FRAMING INNOVATION: DO PROFESSIONAL LEARNING COMMUNITIES INFLUENCE ACCEPTANCE OF LARGE-SCALE TECHNOLOGY INITIATIVES?

by

Anna P. Nolin

Dr. Vincent Cho and Dr. Diana C. Pullin, dissertation co-chairs

Abstract

This study explored the role of professional learning communities for district leadership implementing large-scale technology initiatives such as 1:1 implementations (one computing device for every student). The existing literature regarding technology leadership is limited, as is literature on how districts use existing collaborative structures such as professional learning communities (PLCs) to implement technology initiatives. This study examined how superintendents and their leadership teams expect educator collaboration and whether and how they connect these expectations to large-scale technology implementation. Specifically, the concept of professional learning communities (PLCs) and their constructs were studied as collaborative mechanisms designed to support educators implementing large-scale technology initiatives. This qualitative study employs a multiple case study method to explore how the use of collaborative structures supported large-scale technology implementation in five school districts. These respondents and their stories detail a unique moment in educational leadership as increasing numbers of districts seek to implement such large-scale initiatives in school systems.
Study results highlight how superintendents use leadership planning and implementation teams to serve as PLCs at the district level. This study confirms that the collaborative constructs of the PLC do serve to assist in the implementation of large-scale technology implementations in school systems, but largely at the central office strategic planning level. Superintendents utilize these collaborative structures for personal learning as they design implementation but do not scale up such structures for use by all educators across the implementation or system. Recommendations are made for use of collaborative structures to create technology educator learning ecologies across school systems.
Executive Summary

Framing Innovation: How Do Superintendents Gain Acceptance for Large-Scale Technology Initiatives?

Erik Arnold, Peter Cohen, Gina Flanagan, Anna Nolin & Henry Turner

March 2014
Research conducted and report produced in partial fulfillment of the requirements for the degree of Doctor of Education.

Dissertation Committee

Diana C. Pullin, J.D., Ph.D., Dissertation Chair
Professor, Educational Leadership and Higher Education, Lynch School of Education, Boston College

Vincent Cho, Ph.D., Dissertation Chair
Professor, Educational Leadership and Higher Education, Lynch School of Education, Boston College

Damien Bebell, Ph.D.
Assistant Research Professor; Senior Research Associate, Center for the Study of Testing, Evaluation and Education Policy, Lynch School of Education, Boston College

Daniel Gutekanst, Ph.D
Superintendent of Needham Public Schools

Acknowledgements

Our research team thanks the superintendents and their district administrators who participated in this study. Their time, support, candidness and willingness to open up their school district throughout this process provided us an extremely valuable learning experience.

We extend our gratitude to our dissertation committee for their time, support, and advice every step of the way of this study. You challenged us to look at things differently and calmly guided us to the end.
Context and Background

In recent years, school districts across the country have begun to identify the academic promise and possibilities that technology may have on teaching and learning. Despite inconclusive research on the impact of technology use on teaching and learning, school districts have moved ahead with securing the funding and acceptance from stakeholders to support 1:1 laptop/tablet, Bring Your Own Device (BYOD) or Blended Learning Environments initiatives (Nagel, 2010).

A 1:1 initiative ensures that every student has access to either a district owned or family leased/purchased device and the wireless infrastructure at school to support these devices. A BYOD initiative accommodates family owned technology devices of all kinds. A Blended Learning Environment supports a combination of a 1:1 and BYOD environment. The focus towards these learning environments has caused school districts to look for creative ways to secure funding to purchase technology devices and improve their wireless infrastructure (Salerno & Vonhof, 2011). It is estimated that in 2009 alone, U.S. school districts spent over $7 billion on technology purchases (Dexter, 2011).

A 2010 National School Boards Association survey showed that 37% of school districts have some type of 1:1 computer initiative in place and this number continues to grow (Nagel, 2010). It is our assumption that superintendents are no longer asking whether it makes sense to move towards a large-scale technology initiative, but rather when and, most urgently, how. For many school leaders, efforts to effectively and seamlessly integrate technology to meet the goals of increased student achievement and productivity require “buy-in” from district stakeholders at all levels—central office staff, teachers, students, parents and the community-at-large.

Purpose of This Study

While superintendents often seek informal guidance on technology integration decision making from other districts that have already implemented such an initiative, these methods often provide a fragmented and broad road map that often focuses on the logistics of a technology initiative and not necessarily on the leadership moves that a superintendent should employ in order to gain acceptance.

There does not appear to be a comprehensive, individualized, research-based guide to technology integrations that takes into account the unique
political, cultural and socioeconomic characteristics of various school districts that are considering this movement. There is also no research-based study available to superintendents to help them understand and consider the leadership moves that may help them gain acceptance for a large-scale technology movement.

Guided by research related to frame theory, the superintendent’s instructional vision, distributed leadership, professional learning communities, technology infrastructure decision-making and the superintendent’s use and attitudes toward technology use, this research team worked toward gaining an understanding of the leadership moves that superintendents utilize to gain acceptance of a large-scale technology initiative. These five interconnected studies are aligned to the overarching study.

Methodology

This study is categorized as a multi-case study of school districts within one state where a 1:1 large-scale technology initiative was implemented. Both the overarching (how superintendents gain acceptance of a large-scale technology initiative) and the individual studies focused on specific leadership moves (instructional vision, distributed leadership, professional learning communities, technology infrastructure and the superintendent’s technology use and attitudes). All individual studies employed the same methodologies and protocols of interviews from five superintendents and individuals that they
identified as being key players in their large-scale technology initiative. Interview questions were designed to address the components of both the overarching and individual studies. This is outlined in the chart below.

**Individual Study and Corresponding Research Questions**

<table>
<thead>
<tr>
<th>Individual Spoke/Author</th>
<th>Research Questions</th>
</tr>
</thead>
</table>
| **Instructional Vision** (Flanagan, 2014) | • What is the instructional vision of superintendents who implement large-scale technology initiatives in a 1:1 or BYOD environment?  
• How does the superintendent connect his or her instructional vision with the implementation of technology within the district to all stakeholders?  
• How do district administrators make sense of the superintendent’s instructional vision for technology? |
| **Distributed Leadership** (Turner, 2014) | • Who does a superintendent work with to gain acceptance of large-scale technology initiatives?  
• How do members of leadership teams interact with each other around large-scale technology initiatives?  
• How do members of a leadership team interact with each other around large-scale technology initiatives? |
| **Decision-Making Regarding Infrastructure** (Arnold, 2014) | • What factors are considered by superintendents in making decisions about technology infrastructure?  
• What factors are considered by superintendents in making decisions about funding the large-scale technology initiative?  
• How did the technology infrastructure or funding decisions have an impact on the perceived acceptance of the initiative? |
| **Communication & Modeling** (Cohen, 2014) | • How do superintendents and other district leaders use technology?  
• What are their attitudes about technology?  
• How do these attitudes influence their framing? |
| **Professional Learning Communities** (Nolin, 2014) | • What are the superintendent’s expectations around collaboration?  
• What is the relationship between district expectations for professional collaboration and acceptance of large-scale technology initiatives in school districts?
Additionally a within-case and cross-case analysis of the data collected from interviews was conducted. A description of school districts that participated in this study is reflected below. The titles of district administrators that participated in this study included superintendent, principal, assistant principal, director of technology, technology integration specialist, network manager, director of academics and district grant writer.

**Description of Participating School Districts**

<table>
<thead>
<tr>
<th>System</th>
<th>System size in number of students</th>
<th>Type of Technology Implementation</th>
<th>Grade Level of Technology implementation</th>
<th>Number of Interview Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams</td>
<td>3600</td>
<td>District Provided iPads</td>
<td>Grades 1, 4-12</td>
<td>4</td>
</tr>
<tr>
<td>Jefferson</td>
<td>2900</td>
<td>District Provided iPads</td>
<td>Grades 9-12</td>
<td>3</td>
</tr>
<tr>
<td>Madison</td>
<td>1000</td>
<td>Blended Design of DPD carts, Lease-to-Own and Bring Your Own Device</td>
<td>All grades, parent purchase dependent, carts at all schools &amp; levels</td>
<td>5</td>
</tr>
<tr>
<td>Monroe</td>
<td>2700</td>
<td>District Provided Mac Laptops</td>
<td>Grades 6-12</td>
<td>3</td>
</tr>
<tr>
<td>Washington</td>
<td>4400</td>
<td>Bring Your Own Device</td>
<td>Grades 6-12, parent purchase dependent, carts at all schools</td>
<td>8</td>
</tr>
</tbody>
</table>
Findings

As previously stated, this study included an overarching research question concerning the leadership moves superintendents employ when implementing a large-scale technology initiative as well as five individual studies on areas related to that process. The findings for the entire study are delineated below to reflect each aspect of this study.

1. Superintendents achieved resonance through leadership actions consistent with prognostic and motivational framing.

2. Superintendents considered constraints the initiative might face in conjunction with prognostic and motivation framing in order to gain acceptance of the initiative.

3. Superintendents developed strategic processes to gain acceptance of the initiative.

Achieving Resonance Through Prognostic and Motivational Framing

Frame theory identifies the development of resonance amongst stakeholders in any social movement as a key method of gaining acceptance (Benford & Snow, 2000). With any large-scale initiative, such as a technology initiative, the superintendent works to help his or her constituencies understand and accept the rationale for any movement through resonance (Park, Daly & Guerra, 2012). In this study, the use of prognostic and motivational framing was consistent with each superintendent. Prognostic framing works to create a solution to a
problem through goals and a structured plan (Coburn, 2006). All superintendents in this study had goals for what they hoped the technology initiative would accomplish. This ranged from access to devices to various teaching and learning goals. Motivational framing refers to how the rationale or a “call to action” is articulated (Park, et.al., 2014, p. 4). Throughout this study, the superintendents demonstrated that effective communication to all constituencies was important in gaining acceptance for the technology initiative. Superintendents demonstrated this through the use of informational meetings, district websites, social media and blogs.

Identification of Constraints with the Technology Initiative

Each of the superintendents that participated in this study identified and assessed constraints related to the technology initiative to their constituencies. These constraints were an element of the prognostic framing in which superintendents developed solutions to goals via structured plans for improvement (Benford and Snow, 2000). These constraints were often financial or political in nature, but also included competing interests and issues with technology support staffing. Identified financial constraints were most prominent in all the districts that participated in this study. This factor often played a role in the decision regarding what devices or implementation model would be adopted. Political constraints often centered on the lack of support from various stakeholders, whether perceived or actual. Competing interests became a constraint when local or state initiatives were in place at the same time as the technology initiative and effected time and money allocations. Nearly all superintendents identified constraints in the capacity of their existing technology staff to support the initiative.

Superintendents Developed Strategic Processes

Strategic processes are also components of frame theory that identify specific actions of the superintendent to gain acceptance within the district. In our study, we identified several strategic processes that superintendents utilized to create buy-in for the technology initiative. This included: conducting research about the technology implementation, equipment selection, identifying key players, piloting devices, conducting professional development, communicating the expectations for use, maximizing public relations and assessing the capacity of the technology staff.
Discussion

The overarching study produced contributions to both theory and practice. Theoretical contributions in the area of frame theory highlighted that the use of prognostic and motivational framing were highly utilized professional practices in developing resonance for technology initiatives (see figure below). This included the identification of specific leadership actions that could be utilized to gain resonance/acceptance of the technology.

In terms of the elements of prognostic and motivational framing, this study indicates that this is not a linear process in districts that are working to gain acceptance of a large-scale technology initiative. Districts in this study did not start by first identifying a problem. All started by the goal of integrating technology into their district. This study makes the important contribution to frame theory by highlighting the mix of leadership actions and effective communication that can help a superintendent gain acceptance for a large-scale technology initiative.

Limitations. Because this study only examined five school districts, the data were limiting in terms of identifying themes and conclusions. By expanding the number of districts, there could be more generalizability of the findings. Another limitation included the lack of urban districts in this study. It is unclear on how this demographic component would affect the findings. As interviews were conducted through the recommendation of the superintendent, this might have skewed interviews to support the superintendent. This study did not interview teachers, students or parents. This perspective might have created different findings particularly to the areas of instructional vision and communication. This study did not look at student achievement in these five districts nor did it quantify the use of technology in classrooms. It also did not look at districts where a large-scale technology initiative was attempted, but did not gain acceptance.

Considerations for Future Study. This study found that the diagnostic frame of frame theory, in which leaders identify a problem through the processing of blame and then define goals to resolve issues, was only present in one district. Since this study focuses on how leaders frame issues in a large-scale technology initiative, this would seem to have some relevance. Additionally, as this study examined only districts where acceptance was gained for the technology initiative, it would be interesting to examine what has contributed to districts that have failed to gain acceptance of a large-scale technology initiative. Lastly, another interesting future study would be to include teachers into the mix of participants. Our study did not measure the
degree of resonance in the classrooms that was achieved in each district. This perspective would be a great counter to this study’s focus on leadership actions.

The Use of Prognostic and Motivation Framing in a Large-Scale Technology Initiative
Recommendations

Districts that have not already implemented a large-scale technology initiative may benefit from this study by applying their own individualized lens of their district to the actions listed in this study that can be replicated regardless of demographics. These general recommendations are listed below and described in detail in the full study:

1. Prepare for the initiative with self-assessments, research and a strategic plan.
2. Carefully plan communication and public relations efforts to garner buy-in.
3. Ensure effective staff is in place to lead the initiative.
4. Anticipate obstacles so that you can plan solutions.

Individual Studies: Findings and Recommendations

1. What is the instructional vision of superintendents who implement large-scale technology initiatives in a 1:1 or BYOD environment?

The instructional vision of superintendents who have participated in a large-scale technology initiative is often connected to constructivist/21st century learning components such as: communication, collaboration, creativity, student engagement, real world applications and technology use. This is consistent with early studies that suggest that constructivist/21st century learning skills are supported in technology integration efforts of schools and can assist with helping to create buy-in for these initiatives (Howland, Jonassen, Marra & Moore, 2003; Jonassen, Peck & Wilson, 1999; Dede, 2010; Boschee, Jensen &
Whitehead, 2003; Haertel, Means, Penuel, Roschelle & Sabelli, 2003). However, in most of the districts who participated in this study, the superintendent’s instructional vision was not consistently re-iterated or emphasized in the district’s mission statement, technology plan or by district administrators.

2. How does the superintendent connect his or her instructional vision with the implementation of technology within the district to all stakeholders?

The development of the instructional vision in a district where a large-scale technology initiative has been implemented did not involve all the district administrators who were identified as key players with the technology initiative. Instead, the vision development involved primarily the superintendent and his leadership team (building principals, central office academic staff). As such, the articulation of the instructional vision in connection with the technology initiative by district administrators was inconsistent in each district. The implementation and communication of the instructional vision in these districts, specifically as it pertained to the technology initiative, was often described as much more collaborative, involving all stakeholders including teachers, parents and students. The focus was primarily on the technology initiative and how it helped students learn in general, not necessarily how technology addresses the specific teaching and learning goals of the district. Despite this factor, there was some evidence in this study that the use of prognostic framing by the superintendents helped some stakeholders see how the technology initiative could help improve teaching and learning in these districts. Motivational framing of the instructional vision and the technology initiative also helped gain acceptance by (a) emphasizing the importance of the technology initiative to teaching and learning and (b) consistently sending the message to all stakeholders that they had a part in achieving the teaching and learning goals of the district. Both prognostic and motivational framing were primarily evidenced in the utilization of strategic actions related to professional development, the allocation of resources and the communication of the instructional vision and the technology initiative. By creating resonance between the instructional vision and the technology initiative, stakeholders could understand the value of technology in their schools (Coburn, 2006).
3. **How do district administrators make sense of the superintendent’s instructional vision for technology?**

District administrators felt that the superintendent’s leadership in defining and supporting the instructional vision for the initiative was very helpful in gaining acceptance. However, in this study, although most district administrators were inconsistent in their communication and understanding of the superintendent’s articulated instructional vision, they seemed to understand and accept technology’s place in the classroom. Most district administrators often defined the instructional vision as the technology initiative. While almost all district administrators gave examples of how they support the technology initiative, they did not all give examples of how they support the superintendent’s instructional vision. Many district administrators gave their own beliefs regarding teaching and learning when describing the instructional vision for their district that was not necessarily articulated by their superintendent.

**Recommendations**

1. Superintendents should develop, utilize and consistently communicate a meaningful and sustainable instructional vision in the implementation of a large-scale technology initiative. These instructional visions should include elements of constructivist/21st century learning skills to help create resonance with stakeholders.

2. Superintendents should involve stakeholders in the development and implementation of the instructional vision—particularly with the implementation of a large-scale technology initiative.

3. Superintendents should support the development and implementation of the instructional vision in a large-scale technology initiative.
1. **Who does a superintendent work with to gain acceptance of large-scale technology initiatives?**

All five districts had a primary leader and at least two secondary leaders working to gain acceptance of the large-scale technology initiative.

**Primary Leaders**

With the exception of the superintendent of Washington, Brody, the superintendents relied on one person more regularly than the other members of the technology team to help gain acceptance of the initiative. This leader is referred to as the primary leader. These primary leaders did not take the sole power for the initiative, nor were they independent from the authority of the superintendent. Furthermore, in most of the districts these individuals typically described the collaborative work that they were involved in rather than their sole influence. However, in all of the districts a primary leader was identified as the key framer in gaining acceptance of the initiative. In Washington, Brody was the primary leader.

**Secondary Leaders**

Within each district, the superintendent identified similar positions to lead the initiative. These positions included principals, technology directors and instructional technology directors. However, despite their formal titles, each secondary member played various roles with the technology initiative. Additionally, the work that these individuals produced was different among the districts as well. The number of secondary leaders differed as well among the districts. The size of the secondary leadership that the superintendents identified ranged from 3 people to 7 people.

2. **How do superintendents interact with the members of their leadership team around large-scale technology initiatives?**
Superintendents used mainly institutional practices to interact with other leaders and the superintendents mainly took on job tasks that fell clearly within their job description.

**Institutionalized Practices.** Meetings were the more common form of interaction between the superintendent and the people that worked to gain acceptance of the technology initiative in his district. In all of the districts, meetings were an institutionalized practice of interaction between the superintendent and other members of the district. These meetings mostly occurred formally during regularly scheduled meetings.

**Intuitive working relations.** Intuitive working relations were demonstrated in three ways: (a) the technology leaders reached out to the superintendent based upon his skills, (b) the superintendent included non-administrators in an administrative meeting, and (c) the primary leader and the superintendent began working together on this initiative based upon a shared history when the superintendent was in a previous position.

**Coordinated Tasks of Superintendent.** During the interactions between the superintendent and members of the technology leadership team, tasks were coordinated. The superintendents’ tasks were implicit, meaning the tasks fell within their job responsibilities. Generally, the superintendents took responsibility for funding the initiative and communicating the initiative. Around these topics, the superintendent interacted with critical stakeholders around this initiative, which included school leadership, municipal leadership and consultants. Many of these groups made important financial decisions for the initiative. These groups included the school committee in all districts, which approved the budgets in all of the districts that purchased devices for students. In nearly all of the districts, the school committee approved budgets for the devices in the schools as well as approved budgets that included backend infrastructure in the district.

3. How do members of a leadership team interact with each other around large-scale technology initiatives?

Members of the leadership team interacted with each other through various interaction structures and took on both implicit and explicit job tasks.
The primary leaders and secondary leaders regularly interacted through institutionalized practices, collaboration and intuitive working relations. During these meetings they coordinated tasks that fell within and outside of their job descriptions.

**Institutionalized Practices.** Respondents described regular practices of interaction as an institutionalized practice in the school district. These patterns of interactions typically occurred as part of regular meetings or planning and implementing professional development.

**Collaboration.** Primary and secondary leaders identified informal meetings to discuss and plan the initiative. Some of these less formal meetings were spontaneous meetings in which the group collaborated to address a problem.

**Intuitive working relations.** Members described working with other leaders individually based upon their history of working with the leader or based upon leaders skillset. Many of these meetings were used to troubleshoot issues with the initiative. For example, many people described working with the technology director or network administrator to troubleshoot infrastructure challenges or issues for the initiative.

**Coordinated Tasks.** During the meetings primary and secondary leaders coordinated working tasks on the initiative. Some of these tasks were completed jointly, while other tasks were completed individually. Additionally, some of these tasks were implicit and fell clearly within the job description of these leaders, such as supporting teachers in the classroom. However, some tasks were explicit and fell outside of the job description of the leaders, such as meeting with community groups.

**Recommendations**

1. Superintendents should empower leaders with an interest and knowledge in technology leadership.

2. Superintendents should interact and coordinate jobs with technology leaders and encourage technology leaders to interact with each other.
3. District leaders should create structures that allow leaders to take on responsibilities that fall within and outside of their job responsibilities.

**Individual Study: Anna P. Nolin**

Do Professional Learning Communities (PLCs) Influence Acceptance of Large-scale Technology Initiatives?

**Framing Innovation: Technology Implementation and Existence of PLCs in Districts**

The findings of this study indicate that the combination of framing and PLC constructs constitute the creation of an important learning medium—a technology learning ecology—with which to nurture educator learning about technology and increase acceptance of large-scale technology implementations in districts.

Superintendents created their own technology learning ecologies that functioned as PLCs for technology implementation teams, but did not necessarily “scale up” PLCs for district-wide technology learning. Key framers (primary leaders) of the technology initiative were identified in each district. Four superintendents (Jefferson, Madison, Monroe and Washington) created technology leadership ecologies with their technology leadership teams and one superintendent (Adams) did this through connections with his key framer/primary leader (leader of initiative) and through the use of social media and virtual learning networks. These PLC learning ecologies helped the superintendent to understand and implement the initiative.

In districts where more PLC constructs were described in relation to the technology initiative, participants identified more moments of resonance within the initiative and identified fewer constraints around the initiative. A possible synergy between PLCs and motivating educators to accept the initiative is sketched, as is the possibility that PLCs serve as a potential buffer to minimize worry over political or financial barriers to gaining acceptance for the initiative.

**1. What are the superintendent’s expectations around collaboration?**
All superintendents identified shared collaborative time as a formal part of their technology initiative and provided district resources to support it. Collaboration time existed in formal and informal ways. The term “PLCs” or PLC constructs were not directly used as a part of any superintendent’s deliberate strategy to support technology implementation or gain acceptance, even if the system claimed to formally implement PLCs. However, all five superintendents and their leadership teams described PLC construct expectations for shared time, collaborative teams, an action orientation and expectations for continuous improvement in their descriptions of educator work involving the large-scale technology implementation in their districts.

2. What is the relationship between district expectations for professional collaboration and acceptance of large-scale technology initiatives in school districts?

Professional learning communities as a formal part of the district’s overall instructional vision existed only in Washington and Monroe. However, across all five districts, superintendents described research tasks, formal professional development and informal professional development opportunities and provided collaboration around the technology initiatives.

**Research:** In all districts, superintendents actively connected professional collaboration and the technology initiative by creating technology PLCs for their own learning and planning through the use of their technology leadership or vanguard teams and by modeling technology use. Collaboration occurred through strategic planning meetings (virtual and in person), research visits to implementing districts, use of technology to model technology collaboration, and social media and online collaborative platforms.

**Formal Professional Development:** Formal professional development was described by all superintendents using PLC constructs. These experiences were described as a key forms of collaboration around the technology implementation. This professional development collaboration around technology was described as district-coordinated full and half day professional days and graduate workshops. Graduate workshops, due to their formal arrangement, staff’s autonomy in choosing the courses and the fact that many courses were taught by the district’s initiative’s key framer/primary leader emerged prominently as connected to PLCs and collaborative learning.
Informal Professional Development: Informal professional development was described by superintendents as connected to the technology initiative, but were not consistently described using PLC constructs. These professional development experiences were described as job-embedded shared collaboration time, workshops provided in various forms by technology integration specialists, after-school drop in technology help sessions, use of video conference distance learning to collaborate and use of memos or social media to read about new technology practices.

Like the learning medium described in Zhao & Frank (2003), PLCs help to create a “learning ecology” that nourishes development of the work in the system. While PLCs may not be necessary to gain initial acceptance for large-scale technology initiatives, they may be critical to sustaining acceptance or maximizing the initiative in the systems. This study indicates that PLCs do have a relationship to motivating staff and leaders within the district and for minimizing the effect of district constraints that threaten to hamper or slow the diffusion of technology implementation through the school system.

Recommendations

1. Grow PLC culture by combining PLCs with research, choice and formal professional development for all educators impacted by the technology initiative. The act of doing so strengthens the collaborative culture and deepens organizational learning around new initiatives, policies and practices (Talbert, 2009; Honig, 2006).

2. Create small innovation/implementation teams across the school system to aid in collaborative learning. Such teams create a sense-making learning ecology between all levels of the school organization (Spillane, Reiser & Reinter, 2002) enable innovation, sustain adult intention and autonomy while allowing for change, creativity, chaos and variety in adult learning and growing (Eisenhardt & Zbaracki, 1992; Nonanka, Umembto & Sasaki, 1998). Such regular team learning and mutual engagement sustains connections across the new implementation (Coburn & Stein, 2006).
1. What factors are considered by superintendents in making decisions about technology infrastructure?
Superintendents valued the capabilities and reliability of a device and were willing to pay more (within budget) for a device that had these qualities. The capabilities of the device could include things such as: battery life, audio/video recording, full size keyboard, variety of apps or software, portability, and ease of use. A reliable device would be one that is still likely to operate correctly even when it is constantly being transported from class to class and from school to home over a several year period. All superintendents considered a device to be reliable if they got three to four years of serviceable life from each device.

2. What factors are considered by superintendents in making decisions about funding the large-scale technology initiative?
Superintendents funded 1:1 initiatives by seizing one-time budget opportunities and through creative financial moves. Superintendents considered the financial sustainability of the large-scale technology initiative before committing to it. In addition to the reliability and cost of the device, superintendents chose devices that they believed had the features and capabilities that their students and teachers needed in the classroom. No superintendent purchased the least expensive device available (netbook, Chromebook, iPod). Instead, given the budget they had available, they purchased the device they thought offered the best reliability and capabilities for their students and teachers. Four of the five districts in this study had a portion of their large-scale technology initiative paid for by the state as part of a new building or renovation project. Some superintendents used political maneuvers to get a fixed sum in the budget that was dedicated for technology purchases. The superintendent typically worked with members of the Town Finance Committee (FINCOM) to secure these funds. Another important finding was that superintendents of this study considered the financial sustainability of the large-scale technology initiative before committing to it.

3. How did the technology infrastructure or funding decisions have an impact on the perceived acceptance of the initiative?
Robust and reliable Wi-Fi networks were recognized as being critical to gaining acceptance by teachers for 1:1 initiatives. A reliable network is one that is, rarely, if ever, not functioning properly (operational 99.9% of the time). All districts indicated they put the necessary planning and funds into their wireless networks in order to support their large-scale technology initiative.

**Recommendations**

1. District leaders need to make the necessary investments in their wireless networks to ensure they are robust and reliable.

2. School districts who do not believe they have the funds necessary to sustain a 1:1 initiative should consider a lease-to-own model. This should be done with the consultation of legal counsel.

3. Superintendents should have a plan to sustain the initiative when new equipment needs to be replaced.

---

**Individual Study: Peter D. Cohen**

The Impact of the Superintendent’s Attitude and Use of Technology on the Acceptance of Large-scale Technology Initiatives

1. **How do superintendents and other district leaders use technology?**

All of the superintendents and district leaders in this study use technology in their everyday practice. The specific devices used include a range of laptops, tablets, and smart phones with the common thread to each of these tools being mobility and access to Wi-Fi. Regardless of the specific brand of device, having the capability to access email and the web from anywhere at anytime was vital to work of these leaders. The data suggests that the leaders in this study use technology almost daily and for two main purposes in their professional practice: communication and collaboration.
2. **What are superintendents’ and district leaders’ attitudes about technology?**

While the use of technology by superintendents and other district leaders is somewhat variable, the data suggests that the 5 superintendents studied are aligned their overall attitudes about technology. For example, the superintendents and other district leaders indicated that technology was an important tool for improved instruction. Secondly, leaders in each district discussed the positive influence of technology to ensure that students are college and career ready. Thirdly, there was also an indication that superintendents aspired for their districts to be on the cutting edge as innovative school districts. These leaders did not wish to be behind the technology curve, but instead worked to proactively insert the tools students need to be successful now and in the future.

3. **How do these attitudes influence their framing of large-scale technology initiatives?**

The superintendent in each of the five districts studied reported a positive attitude about the direction of the district in regards to technology. This attitude appears to have more of an impact on the overall acceptance of the technology initiative than the superintendent’s personal use of technology. In other words, while there is no direct correlation between the use of technology by superintendents, the superintendent’s *attitude* about technology is a vital factor in gaining acceptance for the large-scale technology initiative. The findings of this study indicate that a primary leader is essential to frame the initiative. That leader does not need to be the superintendent, but the superintendent needs to also frame the initiative to gain acceptance. Our findings indicate that without the support of the superintendent, the technology initiative will not gain acceptance. Ultimately it is the superintendent who needs to make the case for the funding and sustainability of the initiative.

**Recommendations**

1. **Ensure technology leaders are in place.** The superintendent will be prepared to successfully lead a district into a large-scale technology initiative when proper leadership and staff are in place at all levels of the school district.
2. **Demonstrate conviction and belief in the initiative.** Without a superintendent who fully supports the integration of technology in the schools and moving toward a 1:1 learning environment, large-scale technology initiatives will not be successfully implemented, funded, or sustained.

3. **Promote innovation and sustainability.** Because of the ever-changing landscape of technology, thorough research and planning are needed in order to ensure both technology innovation and sustainability. If a superintendent is going to give support for a large-scale technology initiative, they must insist on decisions being made only after exhaustive research and thoughtful strategic planning has been completed. A successful initiative will require a comprehensive plan where ideas have been vetted, training needs considered, infrastructure requirements delineated, and long term funding solutions created. Innovation requires leaders continuously stay current with the technology. Large-scale technology initiatives require large-scale planning and strong leadership to be forward thinking in order to maintain the direction of the initiative and plan for the future.
Overall Conclusions

As previously stated, this study looked to first understand how superintendents gain acceptance of a large-scale technology initiative. The overarching study led researchers to examine more specific aspects of superintendent leadership that could be useful in implementing a large-scale technology initiative. This included a focus on the superintendent’s instructional vision, role of distributed leadership, creation and development of professional learning around technology, technology decision-making and the superintendent’s use and attitudes regarding technology. While all five research areas presented some very unique findings relative to the area of study that are found in each individual chapter, they also uncovered some common themes across these five spokes.

Superintendents interaction with others. Whether implementing an instructional vision, developing professional learning communities or making decisions regarding the technology infrastructure, all superintendents in this study relied on interactions with district administrators and communication with all stakeholders to help gain acceptance of their large-scale technology initiative. As the study on distributed leadership concluded, superintendents relied on primary leaders/key framers of their district administrative team to develop and implement their technology initiative in all areas of the five individual studies.

The development of strategic processes. As outlined in this study, superintendents utilized a variety of strategic processes in connection with prognostic and motivational framing to generate acceptance of their large-scale technology initiative. Across all spokes of this study, superintendents identified district-wide issues related to the individual focus areas and charted out strategic plans to help address these issues. In preparing for the initiative, the instructional vision, professional learning opportunities, leadership teams, technology infrastructure and communication avenues were all considered as elements necessary to build buy-in for the initiative. These focus areas were continued throughout the implementation phase of the initiative.

Additionally, the strategic process of developing professional learning opportunities related to the initiative was also interwoven within the five spokes. Professional development focused on moving forward the instructional vision of
the district, involved the assistance of primary leaders/key framers, took into account the technology tools and infrastructure of the district and was communicated by the superintendent through various avenues including social media, blogs, newsletter and the district website to name a few.

The overall study, in conjunction with the five related studies, all focus on the leadership actions that superintendents employ when working to gain acceptance of a large-scale technology initiative. This study has shown that the superintendent’s framing of the technology initiative and the strategic actions that he or she utilizes throughout the initiative related to each of the five spokes of this study are vital to developing resonance, and ultimately acceptance by stakeholders.

Recommendations

1. Self assess and create a strategic plan.
2. Carefully plan communication and public relations efforts to garner buy-in.
3. Ensure effective staff is in place to lead the initiative.
4. Anticipate obstacles so that you can plan solutions.
References


Dedication

This is dedicated to my husband, Benjamin Halpern, and my two children, Ethan and Ava, whose strong support made this degree and study possible.
Acknowledgements

I would like to thank the Professional School Administrator Program (PSAP) staff for their support and challenge over the course of this degree and study. My gratitude extends to Dr. Vincent Cho and Dr. Diana Pullin for their guidance and support-- to Dr. Daniel Gutenkanst for his practical and reassuring feedback and to Dr. Damien Bebell for sharing his time and expertise with our research group.

Finally, thank you to the research team, Henry Turner, Gina Flanagan, Erik Arnold and Peter Cohen for going this road with me, challenging me, making me laugh, and for sharing this journey of academic excellence and professional collaboration. I am proud that you are a part of my professional learning community, and I hope we long remain connected leaders in our state.
Table of Contents

ABSTRACT ................................................................................................................... 1

EXECUTIVE SUMMARY .............................................................................................. III

DEDICATION ................................................................................................................. XXX

ACKNOWLEDGEMENTS ............................................................................................... XXXI

LIST OF TABLES AND FIGURES .................................................................................. XXXVII

CHAPTER ONE — INTRODUCTION ............................................................................. 1

Theoretical Rationale .................................................................................................. 5

Research Design ......................................................................................................... 5

Methodology ............................................................................................................... 6

Overview of Chapters .................................................................................................. 7

CHAPTER TWO — LITERATURE REVIEW .................................................................... 8

Large-scale Technology Initiatives in Schools ............................................................... 9

Instructional Technology Devices ............................................................................... 9

Use of Instructional Technology in the Classroom ...................................................... 10

The Role of Instructional Leadership and Technology Leadership ............................ 12

Instructional Leadership ............................................................................................. 15

Superintendent and the Leadership Team ................................................................. 16

The Superintendent .................................................................................................... 17

District Leadership ....................................................................................................... 18

Theoretical Framework ............................................................................................... 25

Frame Theory ................................................................................................................ 26

CHAPTER THREE — METHODOLOGY ....................................................................... 33

Spokes of Related Study ............................................................................................ 33

Design of Study ............................................................................................................ 34

xxxii
STUDY DISTRICTS .................................................................................................................. 36

Washington School District ................................................................................................. 40

Adams School District ........................................................................................................ 40

Jefferson School District ..................................................................................................... 41

The Madison School District ............................................................................................... 42

The Monroe School District ................................................................................................. 42

DATA COLLECTION ............................................................................................................. 45

Interview Sample ................................................................................................................ 45

Interview Procedures .......................................................................................................... 46

Documents .......................................................................................................................... 47

DATA ANALYSIS ................................................................................................................ 48

Tracking and Organizing Researcher Thinking .................................................................. 49

Coding ................................................................................................................................ 51

DEVELOPING AND ANALYZING CASES ........................................................................... 55

Within-Case Analysis ......................................................................................................... 58

Cross-Case Analysis ........................................................................................................... 59

Thematic Conceptual Matrix and Graphic Illustration of Findings .................................. 59

LIMITATIONS/DELIMITATIONS AND VALIDITY/RELIABILITY OF RESEARCH ............... 60

Limitations and Delimitations .............................................................................................. 61

Validity ................................................................................................................................ 62

Reliability ............................................................................................................................ 64

CHAPTER 4 — FINDINGS ..................................................................................................... 68

ACHIEVING RESONANCE ................................................................................................... 69

Prognostic Framing .............................................................................................................. 70

Motivational Framing .......................................................................................................... 71
CHAPTER FIVE — FRAMING INNOVATION: DO PROFESSIONAL LEARNING COMMUNITIES INFLUENCE ACCEPTANCE OF LARGE-SCALE TECHNOLOGY INITIATIVES? ................................................................. 101

PROBLEM ............................................................................................................. 101

LITERATURE REVIEW ......................................................................................... 106

PLCs: A Popular Collaborative Framework in Schools ........................................ 106

Use and Impact of PLCs in Schools ................................................................. 107

Technology Use In Schools ............................................................................. 109

Technology Leadership .................................................................................. 110

A Technology Learning Ecology for Educators ............................................. 110

Collaborative Learning Community and Innovation ...................................... 111

PLCs, Technology Implementation and Framing Innovation ............................. 112

METHODOLOGY ................................................................................................. 114

The Study Context .......................................................................................... 115

Data Sets ........................................................................................................... 115
APPENDICES ........................................................................................................233

APPENDIX A: LETTER INVITING ACCESSIBLE POPULATION TO INTERVIEW .................233
APPENDIX B: QUESTIONS FOR SUPERINTENDENTS IN INITIAL PHONE SCREENING ..........234
APPENDIX C: CONSENT TO PARTICIPATE IN PHONE INTERVIEWS (SUPERINTENDENTS) ......235
APPENDIX D: CONSENT TO PARTICIPATE IN INTERVIEW .............................................237
APPENDIX E: INTERVIEW PROTOCOL & GUIDE ............................................................241

Notes to Interviewer .................................................................................................241

Superintendent Interview Protocol ...........................................................................243
Non-Superintendent Interview Protocol ....................................................................248

APPENDIX F: FORMAT FOR INTERIM SUMMARIES .......................................................253
APPENDIX G: STATE SCHOOL DISTRICTS WITH PLC ASPECTS ..................................254
APPENDIX H: SCHOLARLY ARTICLES REFERENCING PLC CONSTRUCTS .........................256
APPENDIX I: DEFINED TERMS.......................................................................................257
APPENDIX J: INITIAL CODES - INSTRUCTIONAL VISION & TECHNOLOGY IMPLEMENTATION 258
APPENDIX K: CODES FOR SUPERINTENDENT TECHNOLOGY USE & ATTITUDES .............261
APPENDIX L: INFRASTRUCTURE CODE DICTIONARY ...................................................262
APPENDIX M: PLC - INITIAL SET OF PROVISIONAL START-LIST CODES .....................263
APPENDIX N: DESCRIPTIVE CODES DISTRIBUTED LEADERSHIP ..................................264
APPENDIX O: PATTERN CODES....................................................................................264
APPENDIX P: INSTRUCTIONAL VISION INTERVIEW QUESTIONS ..................................265
APPENDIX Q: COMMUNICATED INSTRUCTIONAL VISION ...........................................267
List of Tables and Figures

Table 1  Individual Studies and Research Questions ..........................................................35
Table 2  Description of Study School Systems .................................................................39
Table 3  Pseudonyms for Interviewed Members of the Technology Leadership Team .................................................44
Table 4  Documents Reviewed by District ........................................................................48
Table 5  Initial Set of Provisional Codes and Revised Sub Codes .....................................53
Table 6  PLC Constructs and Descriptions ........................................................................107
Table 7  Type(s) of Framing Used by Superintendent in Technology Implementation, by District ..........................................................126
Table 8  Key Initiative Framers Type(s) of Framing Used in Technology Implementation, by District ................................................................126
Table 9  Description of Superintendent Expectations ......................................................134

Figure 1  Overview of the Study .........................................................................................6
Figure 2  Researcher Team Coding and Analysis Process .................................................58
Figure 3  Conceptual Map – Frame Theory ......................................................................74
Figure 4  PLC Constructs and Relationship to Areas of Initiative Resonance and Constraint ................................................................128
Figure 5  Theory of PLC relationship to gaining acceptance for large-scale technology initiatives ................................................................157
Figure 6  Conceptual Map – Frame Theory ......................................................................178
Chapter One

Introduction

In recent years, technology companies have developed mobile devices such as tablets and laptops that allow students to transport the devices from the classroom to the home with ease. Many school systems have begun to identify the academic promise and possibilities that these devices may have on teaching and learning. Therefore, every year more school districts have secured the funding to purchase devices for students, or opened their wireless network for students to bring their personal devices with them to school (Nagel, 2010). Within each district the programs might be referred to as 1:1 tablet or laptop and Bring Your Own Device (BYOD) initiatives.

For the purposes of this study, we define large-scale technology initiatives as those technology adoptions in public school districts that seek to provide a one-to-one (1:1) computing or tablet device for every student in a section or level of the school system, for example, one tablet or laptop for all students in grades 8-12. One-to-one (1:1) is defined as one computing device per child in the classroom setting combined with ubiquitous access to the Internet and all the power of a wired Internet connection for instruction. These 1:1 initiatives can employ a District Provided Device (DPD), Bring Your Own Device (BYOD), District Sponsored Lease-to-Own (LTO), or a Blended design (Salerno & Vonhof, 2011). District provided devices are selected, paid for, and maintained by the school system. BYOD initiatives ask that, in some manner, families of students bear the financial burden of purchasing the device for student use in the classroom. BYOD initiatives can range from districts allowing any and all devices for

---

1 This chapter was jointly written by the authors listed and reflects the team approach of this project: Gina E. Flanagan, Anna P. Nolin, & Henry J. Turner with Erik P. Arnold, Peter D. Cohen
classroom use to strictly limiting the choice of devices. A lease-to-own model pushes the cost of the device to families, but it allows for it to be paid for in installments, often over a three or four year period. A blended technology school district would utilize a combination of DPD, BYOD, or LTO.

As support to the work of school districts, researchers have begun to identify potential ways in which these devices can support or even transform the learning environment (Bebell & Kay, 2010; Bebell & O'Dwyer, 2010; Dunleavy, Dexter & Heinecke, 2007; Weston & Bain, 2010; Zucker & Light, 2009). There are researchers who have found that technology integration in schools can have a positive impact on student learning (Bebell, 2010; Darling-Hammond, Meyerson, LaPointe, & Orr, 2010; Roschelle, Pea, Hoadley, Gordin, & Means, 2000; Sánchez & Salazar, 2012). This research remains relatively new and faces the challenge of refuting well-established technology integration critics. These critics found technology reforms to be ineffective, inconsistently implemented or to have no aggregate effect on education and therefore remain skeptical of such reforms (Cuban, et al., 2001; Ertmer, 2005; Tyack & Cuban, 1995; Wallace, 2004; Zhao & Frank, 2003).

Despite the debate within the research, many district leaders have moved ahead and secured funding and acceptance from their various constituencies: school board, taxpayers, building administrators, and/or teachers. It is estimated that in 2009, U.S. school districts spent over $7 billion on technology purchases and that the market is expected to continue to grow with the increasing number of schools introducing 1:1 computing initiatives (Compass Intelligence, 2010, Zucker & Light, 2000). A 2010 National School Boards Association survey showed that 37% of school districts had some
type of 1:1 computer initiative already in place and if the trend continues that percentage will continue to grow (Nagel, 2010). This commitment to developing technology has occurred in schools with no guarantee of success, or at best, differing views of success.

There can be a heavy price tag for school districts to consider when implementing a 1:1 technology initiative. Even though tablets and laptops are becoming more affordable, purchasing a device for each student is still cost prohibitive for most districts, as is building up a district’s infrastructure to implement 1:1 initiatives of any sort. Many school districts are challenged to find ways to fund and sustain the initial expenses of a large-scale technology initiative as well as the many other initiatives that are being supported in their district at the same time. Additionally, efforts to seamlessly integrate technology with the goal of increasing student achievement and productivity may be met with mixed results in terms of teacher “buy-in” and learning outcomes. Bebell, Russell and O’Dwyer (2003) noted that these mixed results have been due to problems with decision-making and implementation rather than the actual technology.

While superintendents might seek informal guidance on technology decision-making from districts that have implemented technology, as well as utilizing frameworks from educational organizations that focus on technology integration such as Project Red and the Partnership for 21st Century Skills (Partnership for 21st Century Skills, 2009; Project Red 2010), these methods provide a fragmented and broad road map to technology integration, often focusing on the structural components of the integration and not necessarily the leadership moves that a superintendent should employ in order to help gain acceptance.
By themselves, these methods do not provide a comprehensive, individualized guide to technology integration that takes into account the unique political, cultural and social-economic characteristics of various districts that are considering this movement. There does not appear to be a research-based study available to superintendents to help them understand and consider the leadership moves that may help them gain acceptance for a large-scale technology movement.

Despite the many issues to consider when developing a large-scale technology initiative, it is our assumption that superintendents are no longer asking whether it makes sense to move towards large-scale technology initiatives, but rather when and, most urgently, how. As more districts move toward technology integration in classrooms, the pressure increases on all superintendents to decide for their own districts how they might implement these large-scale technology initiatives. Therefore, our aim was to study what superintendents do to gain acceptance for large-scale technology initiatives in their school systems. The overarching study will focus on the following research question: How do superintendents gain acceptance for a large-scale technology initiative? Specifically, this includes the examination of leadership moves of superintendents that contribute to this acceptance. This aspect of the study will be presented through five individual studies related to superintendent leadership in a large-scale technology initiative.

**Preview of the Dissertation in Practice**

In order to understand the context of the overarching and individual studies related to this dissertation, we provide a preview of the theoretical rationale, research design, methodology, and the organization of chapters below.
Theoretical Rationale

The study of frame theory provides an examination of how various social movements, such as a large-scale technology initiative, gain acceptance through various strategic actions. By examining various aspects of frame theory including motivational and prognostic framing, the development and use of resonance and the strategic actions that accompany this, we look to uncover if frame theory is an effective lens that superintendents apply when seeking acceptance of a large-scale technology initiative.

Research Design

As the overarching study seeks to identify actions of superintendents that are used to gain acceptance of a large-scale technology initiative through the lens of frame theory, it also includes five interconnected studies that emerge from the overarching study. The results and discussion of frame theory and technology innovation can be found in Chapters 4 and 6. The individual studies focus on various areas of leadership that superintendents might engage in during this type of initiative. This includes how superintendents utilize distributed leadership (Turner, 2014), instructional vision (Flanagan, 2014), professional learning communities (Nolin, 2014), technology decision-making (Arnold, 2014) and the superintendent’s use and attitudes regarding technology (Cohen, 2014). These relationships to the overarching study are represented in Figure 1 below:
Figure 1. An overview of the complete study. The overarching study is in the middle with the five individual studies surrounding it. Each individual study (or spoke) provides data to answer the central research question of our overarching study.

As the overarching study utilizes the lens of frame theory to the study of leadership actions, the five individual studies do so as well.

**Methodology**

This is a multi-case study of districts within one state that were each independently implementing a large-scale, 1:1 technology initiative. Both the overarching and individual studies employ the same methodologies and interview protocols for five superintendents and the individuals that they have identified as being key players in their technology initiative. Additionally, all studies include a within-case and cross-case analysis of the data collected from the interviews. Throughout all sections of the study, coding was used to identify the presence of leadership actions, framing activity, and acceptance of the technology initiative. In the related individual spokes of
this research, codes represented individual research interests and the application of framing actions by the superintendent. This process helped to establish the analysis of frame theory across the five individual studies.

**Overview of Chapters**

In Chapter 2, a review of the literature related to the study of district instructional leadership, technology leadership, technology integration and frame theory provide support to the current inquiry into a superintendent’s leadership actions in a large-scale technology initiative. Chapter 3 describes the methodology employed to collect and analyze data. Chapter 4 presents the findings of the overarching study based on the synthesis of all data collected from the overall study. Chapter 5 presents each of the individual studies related to the actions of superintendents undergoing a large-scale technology initiative. Each of the individual studies identify a problem, provide a literature review of relevant topics related to the study and outline methodologies, findings, contributions to theory and practices and recommendations for superintendents implementing a technology initiative. Chapter 6 addresses the contributions of the overarching study and the individual studies to theory and practice. Chapter 6 also addresses some limitations of this study, the implications for future research and outlines recommended actions for superintendent and district leaders who are undergoing a large-scale technology initiative.
Chapter Two

Literature Review

This study describes what superintendents do to gain acceptance of large-scale technology initiatives. There is no known research on the role of the superintendent as a technology leader. The focus of this research, however, limits large-scale technology initiatives to instructional technology. Relevant research already exists on instructional leadership. Therefore, instructional leadership research was used to help frame this study as well.

This study draws from a broad range of literature from social scientists, business, organizational and education scholars to help us place this question into context. We begin this literature review with a definition of what we mean by “large-scale technology initiatives” in education and discuss our focus on instructional technology. Then this section reviews literature focused on four themes: (a) the conflicting research about large-scale technology initiatives in schools, (b) the relationship between instructional leadership and technology leadership, (c) the role of the superintendent and central office in instructional leadership, and (d) frame theory, our theoretical framework, which guided our data collection, analysis and conclusions for this study.

With this body of literature we will describe the leadership challenges of implementing large-scale initiatives within an organization such as a school district’s technology initiative. Additionally, this literature review demonstrates gaps in research, which further raises the need to study what superintendents do to gain acceptance for these programs.

---

2 This chapter was jointly written by the authors listed and reflects the team approach of this project: Henry J. Turner and Gina E. Flanagan with Erik P. Arnold, Peter D. Cohen, Anna P. Nolin
Large-scale Technology Initiatives in Schools

School districts are purchasing expensive technology with the hope to improve several functions of schooling. Schools have always purchased technology to improve the productivity or job-related functioning of adults in the industry, such as accounting programs and copy machines. Additionally, school districts are now purchasing technology devices directly for instructional purposes to influence student learning as well (Means, Roschelle, Penuel, Sabelli, & Haertel, 2003; Dunleavy, Dexter, & Heinecke, 2007; Bebell & Kay, 2010). Instructional technology devices will be the focus for this study. This section defines instructional technology and its role in schools.

Instructional Technology Devices

For the purpose of this study, instructional technology devices are defined as technology tools that have the potential to improve the capacity for substantial and worthwhile learning through the relations of teachers, students and the technology tool (Ball & Cohen, 1999; Means et al, 2003). These devices could include tablets, smartphones or laptop computers.

Many school districts across the nation are amassing devices such as laptop computers and tablets for students and teachers. Furthermore, some school districts are purchasing an instructional device for every student or allowing students to bring devices to school. Often referred to as one-to-one (1:1) computing in schools, within these initiatives one instructional technology device is assigned to each student for use in a wireless, Internet-connected classroom setting. Therefore, in addition to purchasing devices, many districts are building a wireless infrastructure throughout schools to
support and maximize the use of the devices in classrooms. These initiatives are expensive and typically include taxpayer dollars as a funding stream.

Despite the high costs, many schools have already taken on full-scale 1:1 computing programs. Some of these programs have occurred through statewide initiatives, such as in Maine, Michigan, and North Carolina (Corn, Osborne, Halstead, Oliver, Tigen & Stanhope, 2009; Silvernail & Lane, 2004; Silvernail & Grutter, 2005). More commonly local districts have implemented programs in Virginia, Florida, California, Massachusetts, Iowa, Vermont, Texas and elsewhere (Bebell & Kay, 2010; Cavanaugh, Dawson, White & Valdes, Ritzhaupt & Payne, 2006; Penuel, 2006; Shapely, Sheehan, Sturges, Carnanikas-Walker, Huntsberger & Maloney, 2009; Zucker & Light, 2009). This type and definition of large-scale technology implementation maintains a broad umbrella of instructional technology devices. Furthermore, the definition only incorporates technology used by teachers and students. A description of how these instructional technology programs are used in classrooms follows.

**Use of Instructional Technology in the Classroom**

Emerging research demonstrates several examples of technology uses in the classroom. Means et al. (2003) found that technology influences instruction by providing curriculum resources and creating alternative instructional activities and processes. Additionally, some are teachers using a variety of teaching strategies using the technology devices in their classrooms, which have increased project based learning, student engagement, collaboration, and research skills in the studied classrooms (Dunleavy et al., 2007; Bebell & Kay, 2010). With these strategies, researchers found that technology could more adeptly meet individual learning styles for students (Collins
& Halverson, 2009; Dede, 2011; Selwyn, 2011). Therefore, researchers have demonstrated the potential of technology in the classroom for instructional purposes.

Despite growing research of its effectiveness, instructional technology is a challenging implementation initiative in many schools. In many classrooms instructional technology remains underused and ineffective (Cuban, 1993; Cuban, 2003; Cuban, 2006; Gray, Thomas & Lewis, 2010; Tyack & Cuban, 1995). Furthermore, scholars have identified teacher resistance to be one of the greatest impediments to technology acceptance into the classroom (Zhao & Frank, 2003; Weston & Bain, 2010). Therefore, while some studies showcase the successful use and potential of technology in the classroom, they also highlight the important role that teachers play in determining the success of the integration of instructional technology devices. If instructional technology devices continue to become a larger presence in the classrooms, leaders may need to think about building teacher capacity to accept devices in the classroom.

School and district leaders may be an important group to help teachers accept technology and learn to integrate it into their classrooms. Furthermore, as schools continue to purchase expensive technology, school and district leaders may have to make more decisions about the potential benefits that technology can provide their school system. They may need to provide professional development for staff on how to use technology in the classroom. Finally, leaders may feel constrained by teachers and community members due to the initiative’s high cost and newness to the classroom.

This expectation for large-scale technology to improve an organization has been an important area of focus in business research (Brynjolfsson & Hitt, 2000; Brown, 2001; Acemoglu, Aghion, Lelarge, Van Reenen, & Zilibotti, 2007). However, no known
research exists about the increased expectations for school and district leaders to adopt these initiatives. Leaders, therefore, may need to develop and utilize leadership strategies to ensure acceptance of these initiatives.

In order to achieve this goal, leaders might use both instructional and technology leadership to implement a large-scale technology initiative. If district leaders resolve technology integration problems, the potential for instructional technology to improve education may become more apparent. The relationship between instructional leadership and technology leadership is therefore important to define in today’s educational context.

**The Role of Instructional Leadership and Technology Leadership**

Regardless of any evidence of technology’s benefits in the classroom, technology integration into the classroom has been met with mixed results. Leadership may be one way to improve instructional technology integration in the classroom. Emerging research on both instructional leadership and technology leadership exists and is summarized for use in this study. While this study focused on district level leadership, most of the research in this field has focused on building-level leadership.

**Description of Technology Leadership**

Very few studies have investigated the role of leadership with respect to technology and even these few studies are focused on building-level leadership. Some studies have identified that technology leadership is unique to other forms of school leadership (Anderson & Dexter, 2005; Flanagan & Jacobsen, 2003; Gerard et al., 2010). McLeod and Richardson (2011) demonstrated the need for further study on technology leadership. Although technology leadership remains an emerging research field, early studies suggest that strong technology leadership is an important component to successful
school technology integration (Anderson & Dexter, 2005; Gerard et al., 2010; Dexter, 2011a). Again, all of these studies focus on building-level leadership, such as principals, which raises the question of the role of the central office within this leadership lens. This section will describe the research on technology leadership.

Studies on technology leadership have mostly studied the technical skill of principals, which have found that many school leaders have minimal technical knowledge (Flanagan & Jacobsen, 2003, Gerard et al., 2010). Furthermore, they found that increased technology use existed within the school, including the classroom, when principals had technical skill and knowledge (Flanagan & Jacobsen, 2003; Anderson & Dexter, 2005). These studies defined technical skill as the leader’s ability to use technology within his/her professional life, such as email. Anderson and Dexter’s (2005) comprehensive quantitative study of leadership in a digital environment confirms and correlates the role of technology leadership with increased educational technology usage and integration in schools. The study names basic indicators of administrator leadership to promote technology integration, but the indicators here, again, fall short of defining a student-achievement driven set of technology leadership actions that inspires teachers to integrate technology.

Existing research has yet to study the characteristics of technology leadership focused on student learning. Some research literature has laid the groundwork to study technology and learning; however, they vary in their manner of defining technology integration—conflating teacher personal and administrative use of technology for productivity reasons, such as student information systems, with technology used for instruction, such as instructional technology devices (An & Reigeluth, 2011; Galizio,
Ledesma, Schrum, 2011; Hughes & Zachariah, 2001; Kincaid, 2002; Leonard & Leonard, 2006; McLeod & Richardson, 2011). Therefore, more research is needed that directly links technology leadership effectiveness with student learning. Our study hopes to initiate this scholarly discussion.

Some studies examine school and district characteristics that result in increased use of technology by teachers for their own professional preparation, for delivery of instruction, and in directing students to use technology for production of academic projects (Bebell & Kay, 2010; Bebell & O’Dwyer, 2010; O’Dwyer, Russell & Bebell, 2004; O’Dwyer, Russell & Bebell, 2005). While leadership skills or actions can be inferred through examination of school and district characteristics in a school system, these studies do not directly identify leadership competencies or actions most important for elevating student achievement through technology use.

Technology leadership is an important area for further study because of the complexity of technology and its unique challenge of gaining acceptance within a school setting. Furthermore, the resistance and lack of technical knowledge that people have of technology suggests technology leadership demands leadership actions that may not be necessary for other aspects of leadership (Cuban, 2006; Gerard et al., 2010). These technology initiatives are focused on students using these devices in the classroom. Therefore technology leadership may also relate closely to instructional leadership. Additionally, an analysis of instructional leadership assists in understanding technology leadership and potential links between the two.
**Instructional Leadership**

Researchers have been able to connect building based instructional leadership as a factor in increasing student learning within the classroom (Leithwood, Harris & Hopkins, 2008; Robinson, Lloyd, & Rowe, 2008; Louis, Dretzke, & Wahlstrom, 2010). However, there is only one known study that connects technology leadership with instructional leadership in a school (Dexter, 2011b). Based on this gap in research, examination of the overlapping findings as well as gaps in the research between instructional leadership and technology leadership is required. Additionally, the question of whether technology leadership requires skills and knowledge beyond that required of good instructional leadership must also be contemplated.

Researchers have found that effective instructional leadership exists when teachers and the principal participate in the decision-making (Hallinger & Heck, 1995; Hallinger, 2005). These researchers found that when teachers and principals collaborate they: (a) provide clear goals around student learning, (b) utilize a range of stakeholders, (c) create a climate of high expectations, (d) develop and monitor student learning outcomes, and (e) oversee staff development. Dexter (2011b) found these factors within instructional technology decision-making as well.

Effective instructional leadership and effective technology integration have other common themes as well, such as the need for a clear vision and choosing the correct tools/methods (Ball & Cohen, 1999; Hallinger & Heck, 1996; Anderson & Dexter, 2005). However, technology leadership poses unique challenges, such as technical decision-making (Gerrard, Bowyer & Linn 2008; Gerrard, Bowyer & Linn, 2010). Therefore,
these technical decisions may require the use of several leaders, including some who have technical knowledge, such as technology directors (Dexter, 2011b).

Technology initiatives in school systems often are implemented in more than one school; therefore leadership may be needed to implement larger-scale technology initiatives across a district, requiring a study of technology leadership to include examination of the power and skill of district leadership. Increasingly, researchers are studying the role of the superintendent and central office as instructional leaders outside of a technology context. For this study, the role of the superintendent and the central office around instructional leadership must therefore be studied, which will raise the question as to how technology leadership might be described or have impact at the district level.

**Superintendent and the Leadership Team**

The previous section discussed the relationship between instructional leadership and technology leadership. The research described, however, focused mostly on the leadership of principals. While this study interviewed principals, superintendents remain the focus for this study due to the district-wide and large-scale, community-wide ramifications of 1:1 computing initiatives in a school system. Emerging instructional leadership research demonstrates the important roles of district level leaders in order to implement instructional reforms in schools (Corcoran, Fuhrman, & Belcher, 2001; Hightower, 2002; Elmore, 2004). Therefore, the purpose of this section is to discuss the role of superintendents and their central office staff with instructional leadership. The role of the superintendent must be examined as well as the work of central offices. We will begin with an overview of the role of the superintendent. Next we will discuss the
work of the central office. Finally, we will discuss the work of the superintendent and his/her leadership team in gaining acceptance of instructional initiatives. It should be noted that some district leadership teams include principals. For this study, every participating school district included principals as part of the district leadership team. Thus discussion of the superintendent and central office’s leadership roles will provide a stepping-stone to this research on superintendents as technology leaders.

The Superintendent

The superintendent’s job has become increasingly complex. Often superintendents deal with structural and organizational issues such as facilities and human resource issues within an ever-increasing political dynamic (Petersen & Barnett, 2005; Childress, Elmore, Grossman & Johnson, 2006). Furthermore, superintendents are facing increased pressure from state and federal policy, taxpayers, school councils and other municipality groups (Elmore, 2004). Researchers report that superintendents must contend with an increasingly complex system with less financial flexibility (Orr, 2006). Nevertheless, within this complexity there is a need for superintendents to remain instructional leaders in their district.

Superintendents provide the glue that connects many important district stakeholders including: school boards, parents, building administrators and district administrators. Their direct connection with these stakeholders provides a trickle-down effect of instructional leadership within each school. In working with these groups, the work of the superintendent is to provide a collective instructional vision, ensure collaboration between different departments of the district, and secure appropriate funding for instructional programs and professional development (Petersen & Barnett,
Researchers have begun to study how superintendents carry out these actions within the new dynamics of the position (Childress, et al., 2006).

Despite the increased complexity of the job, researchers found that many superintendents’ instructional responsibilities have remained consistent with the traditional instructional responsibilities superintendents held for a long time regardless of district size. These areas of instructional responsibility include: (a) working with stakeholders such as central office administrators, principals, and school boards, (b) securing and allocating resources, (c) establishing a vision and goals, and (d) evaluating and reviewing instruction using data (Petersen & Barnett, 2005; Childress, et al., 2006).

While these actions may not directly impact student learning, they have a district-wide impact and effect through district and building administrators, which ultimately impacts teaching and learning at the classroom level. With these strategies, superintendents are able to provide oversight and ensure consistency throughout the district during a time in which their job has become more complex. Due to the complexity of the job, however, superintendents must work with their district leadership teams in order to execute the total responsibilities of the position. This central office teamwork is important to the district’s instructional success and the district leadership team must be examined as a component of the superintendent’s instructional leadership.

**District Leadership**

Depending on the size and structure of the school district, superintendents may work with other building and central office administrators to carry out the functions of their job. Therefore, district leaders other than the superintendent can play an important role in carrying out instructional leadership.
Central office leaders possess some of the strongest understanding of education theoretical content as well as instructional best practice within their district, which can be structurally siloed within a department (Hightower, 2002; Honig, 2003). Hightower (2002) identified the isolating nature in a large school district. This structure prevented central office administrators from working collaboratively with other leaders within the organizational structure. Researchers have found that some of the most important leaders in implementing an instructional policy are the non-instructional central office leaders of: the human resource office, facilities office, and business office, etc. as well as building based leaders such as principals (Hightower, 2002; Honig, 2003; Wayman & Cho, 2008; Coburn, Tourre & Yamashita, 2009). When communication between each office occurs, districts are able to think about the total impact of large-scale programs and, by extension, act more cohesively.

Researchers have demonstrated that central office administrators can have an impact on instructional leadership. Much of this impact can be found in supporting the responsibilities of the superintendent through: (a) interpreting data, (b) building district knowledge and skills, (c) aligning curriculum and instruction and (d) targeting interventions on low performing students and/or schools (Massell, 2000). With effective central office leadership, school districts may be able to develop more district consistency and richer professional development. Still, due to the organizational complexity and politics of the district, gaining acceptance of programs within these areas can be challenging. Therefore, district leaders must frame these initiatives through effective communication and strategic thinking.
One of the critical positions that district leaders must gain acceptance from in large-scale district-wide reform work is with building principals. As previously stated, researchers have demonstrated the link of principal instructional leadership to student learning as well as a principals technical skill with increased technology use throughout the school. Therefore, combining the leadership power of the principal, and curricular knowledge of the central office administrators could create an effective relationship with which to provide schools collaborative and evidence based instructional leadership (Hightower, 2002; Honig & Coburn, 2008; Coburn et al, 2009). Therefore, district leaders must utilize strategic thinking and effective communication to gain acceptance of initiatives from principals. While this process is simple and logical, superintendents must gain this acceptance from their teams while balancing all of the other organizational challenges inherent in district leadership. The work of the superintendent is to balance organizational challenges and cultivate the work of their leadership teams.

Work of the superintendent and the leadership team. As previously detailed, district-wide technology initiatives present leadership challenges for school and district leaders. As previously defined, the central office may include instructional or organizational leaders. Furthermore, some school districts may include principals as members of the district leadership team. Despite the complexity for district leaders implementing a technology initiative, no known research addresses the role of such leadership in implementing technology initiatives. However, a variety of research has examined the role of the superintendent and central office in implementing other instructional initiatives and is summarized below. This section describes three categories of work for superintendents and their leadership teams in gaining acceptance of
instructional initiatives: (a) collect evidence of an initiative through data and research; (b) make sense of the evidence for stakeholders, such as parents, school committee and faculty; and (c) build capacity throughout the district to accept the initiative. The rest of this section will explain these three areas of work.

**Collect evidence through data and research.** Through state and local assessments districts are inundated with data (Wayman & Cho, 2008; Honig & Coburn, 2008). Furthermore, state and federal laws mandate central office administrators to utilize and interpret data. Data specialists have become a new and important role in some districts. In turn, central office staff members have begun to focus their decision-making on the evidence collected and analyzed (Honig & Coburn, 2008). Therefore, the challenge for district leaders is not finding and interpreting data that can develop a message, but finding the data that will make an impactful and meaningful message.

One of the challenges for district leaders is the lack of data coherence and knowledge outside of the central office. Honig and Venkateswaran (2012) found that school administrators relied on district administrators to help them incorporate evidence use within their school as well as provide professional development. Another study found that school leaders who were reluctant to utilize data could: (a) focus on using data to address small scale workable problems and (b) select technology that will reduce work or improve work efficiency for school leaders (Wayman & Cho, 2008). As stated before, the relationship between the district leaders and school leaders is critical in order to create meaningful instructional leadership. Therefore, district leaders must choose data that is impactful to leaders and will energize them to use the data. In order to accomplish this successfully, leaders must make sense of the data through a political lens.
**Make sense of evidence.** Researchers have identified sensemaking as an inert task in the central office. Coburn, Tourre and Yamashita (2009) defined sensemaking in the central office as leaders understanding evidence and enacting its use within a school district. This step allows district leaders to make their interpretations of the data and think about how it impacts their district. Additionally, districts must utilize this step in making sense of policies developed by state and federal law as well as research and recommendations from outside consultants.

While districts utilize data to inform their practice, one potential challenge is the political influence for district leaders. Researchers found that district leaders and superintendents understand evidence-based strategies to improve learning, however, their decisions are largely made for political reasons (Spillane, 2005a; Coburn, et al., 2009). Therefore, there is a need to understand how leaders can work within this political structure to improve learning.

Researchers have found that success of these policies and initiatives is founded around the district’s ability to make sense of these ideas as they pertain to the needs and culture of the district (Spillane, 1996; Spillane, 2005a; Spillane, 2005b; Coburn et al., 2009). Spillane (2005a) found that school districts interpreted even the most rigid federal mandates from NCLB from their own perspective, which in many ways went against the intent of the law to mandate uniformity.

**Capacity building.** In addition to sensemaking, another related role of the central office is to provide professional development within the district. As discussed earlier, central office leaders may possess the most instructional and pedagogical knowledge within the district. If they are the most knowledgeable, then their role may be to educate
other educators within the district, including teachers and building-based leaders. Researchers, refer to this level of adult education as capacity building (Spillane & Thompson, 1997; Mulford, 2007).

In order to get stakeholders on board with an instructional reform, the district must possess the capacity to accept this reform. Spillane and Thompson (1997) define capacity for instructional reform as “a complex and interactive configuration”. Additionally, capacity is based upon the willingness of the leadership to support and teach about the initiative and the teachers to have the willingness to adopt the initiative.

Spillane and Thompson (1997) also found that capacity building requires investing in two critical forms of capital: human capital and social capital. Human capital is based upon the knowledge base of the people within the organizations and that the leadership has the knowledge, not only of the initiative, but also to teach people about the initiative. Social capital comes in the form of the trust and collaboration among educators within the district and the ability of the district to gain support from consultants outside of the district. If districts have the robust investment in human and social capital, the stakeholders are more apt to accept the initiative (Mulford, 2007; Spillane & Thompson, 1997).

Stakeholders are also more apt to adopt a new instructional program if the district has a culture as a learning organization. Cohen and Barnes (1993) identified that policymakers often fail to see themselves as teachers of the policies they create. Additionally, they point that policymaking is an opportunity for learning that often goes unnoticed. For example, they note that when the speed limit was reduced to 55, drivers needed to learn to drive slower. Even more than speed limits, some policies require
teaching for people to learn how to adapt to the policy. This is true for programs established by school districts. When creating a program, superintendents and district leaders should recognize the need to teach stakeholders the importance and impact of the program.

However, scholars have highlighted that districts fail to create structures that teach stakeholders about new instructional programs. Often, teachers complain that a new initiative is similar to a previous one that failed. The school districts that establish learning structures for teachers create great opportunities to teach stakeholders the rationale and purpose of the initiative (Ball & Cohen, 1999; Blumenfeld, Fishman, Krajcik, Marx & Soloway, 2000; Elmore & McLaughlin, 1988; Grossman & Thompson, 2004).

Professional development is the most common way in which teachers learn about new district programs. However, professional development “has been the most frequently overlooked component of technology integration since schools began using technology” (Greaves et al., 2010, p. 41). Jacobsen (2001) referenced a survey of educators, conducted by the Alberta Teachers Association Computer Council in 2000, where they were asked to identify the main reasons that were preventing them from integrating technology in their classrooms. According to the survey, over 54% of teachers chose a lack of time to develop lessons that incorporated technology as one roadblock and another 38.6% chose insufficient professional development and/or funding for professional development as a second roadblock. A thorough professional development program would provide time and support for teachers to develop lessons to integrate the technology. The literature is clear that professional development for
integrating technology should be ongoing throughout the year and not just a one-shot three-hour session (Banister, 2011; Jacobsen 2001, 2002; Vaughn, 2010; Waters, 2009).

This section discussed the different roles played by superintendents along with the central office relative to gaining acceptance of initiatives. Researchers identified three areas where district leadership can be impactful around instructional initiatives: (a) collect evidence of an initiative through data and research; (b) make sense of the evidence for stakeholders, such as parents, school committee and faculty; and (c) build capacity throughout the district to accept the initiative. These three actions fall in line with the components of frame theory, which is the theoretical framework for this study.

**Theoretical Framework**

The studies reviewed in this chapter identified the relevant literature to help understand the superintendent’s potential role in gaining acceptance of large-scale technology programs. Literature reviewed included discussion of: (a) the challenges of implementing instructional technology, (b) the need for technology and instructional leadership, and (c) the work of the superintendent and central office in gaining acceptance of instructional initiatives. In the final section, we found three areas in which the superintendent and central office can make an impact in instruction: (a) collecting evidence of an initiative through data and research; (b) making sense of the evidence for stakeholders, such as parents, school committee and faculty; and (c) building capacity throughout the district to accept the initiative. These three actions overlap with several ideas within frame theory. This final section explains frame theory’s role as a theoretical framework for this study.
Through the lens of frame theory, what superintendents do to gain acceptance of large-scale technology programs can be examined. Frame theory discusses the ways in which political or social movements are constructed. A district’s move toward technology acceptance at this time in educational history can be compared to these types of social movements. Furthermore, the day-to-day reform work of the superintendent appears to fall in line with two components of frame theory. For this study, frame theory is used as it was initially conceived in Goffman (1974), and promulgated further in analyses in different social contexts by Benford and Snow (2000), Coburn (2006), and Snow, Rochford, Worden and Benford (1986).

**Frame Theory**

Frame theory lends itself as a framework for how leaders are able to gain acceptance of large-scale initiatives such as those involving technology implementation in districts. Because of its focus on movements, this theory lends itself to study the leadership actions that are required when district leaders move towards educational innovations such as large-scale technology initiative proposals. Frame theory allows for analysis of such large-scale proposals and reform movements from different angles, such as frame analysis is able to show how competing interpretations and perspectives may lead to dramatically different policy designs and degrees of “resonance,” relative to the proposed new initiative implementation (Benford & Snow, 2000). Frame theory also helps leaders understand how to shape a policy in order for constituencies to make sense of the policy. Frame theory lends itself to the practical work of superintendents who lead large-scale technology initiatives.
Research based on this approach has mainly been used to study political communication and media discourse; more particularly, scholars have studied how people are mobilized with a social movement (Snow & Benford, 1988; 1992; Snow et al., 1986; Benford, 1993).

**Frame analysis and technology plan development.** There are many leadership actions employed by superintendents when implementing reform or policy changes in a district including: collaborating with a leadership team, modeling of skills, decision-making, communication with stakeholders and strategic planning. Therefore, we will employ frame theory to help us understand these leadership moves required to maximize “resonance” or the mobilizing potency of superintendent actions conducted to gain acceptance of a district’s technology initiative (Benford & Snow, 2000). There are three key components of frame theory that include frame “development, generation, and elaboration” (Benford & Snow, 2000). Embedded in these components are the three core parts to frame development: *diagnostic framing, prognostic framing, and motivational framing*. Each of these core parts can play a unique role in building a consensus and/or moving people toward action around proposed technology implementations in a district.

Through diagnostic framing, leaders identify a problem that they wish to change. Within social movements these problems were typically identified as an injustice (Benford & Snow, 2000). In education, it can be argued that the creation of NCLB utilized the diagnostic frame to identify an achievement gap in minority and special needs students that was caused by years of inattentive focus by educational systems toward these groups. Diagnostic framing could also be applied to the push toward a 1:1 technology initiative in that there are equity and socio-economic issues with students who
have, and do not have, access to technology in the classroom or at home. It could be argued that this imbalance puts one group at an academic advantage over the other.

Prognostic framing also identifies a problem, but instead of focusing on the aspect of blame, prognostic framing works to carve out solutions via goals and a structured plan to achieving these goals (Coburn, 2006). In the world of education, issues involving student achievement and skill development, for example, are addressed through professional learning communities, district strategic plans and technology plans.

Motivational framing can be viewed as the mechanism used to bring forth collective action particularly through the use of language/communication structures (Benford & Snow, 2000). In relation to technology implementation, the terms, college and career readiness, 21st century learning and global competitiveness, amongst others, have created an urgency to put digital tools into the hands of students and are often the motivational tools of language used to frame technology initiatives.

Superintendent leadership was examined from these various framing perspectives as well as considering various framing characteristics, processes and dynamics that are essential components in the framing implementation; specifically, including the framing concepts of resonance, strategic processes and constraints.

**Resonance.** Theoretical frames help bring meaning to a movement, and thereby, mobilize acceptance of an initiative. A concept similar to acceptance, resonance is an essential characteristic of framing development and implementation (Benford & Snow 2000). Park, Daly, and Guerra (2012) expand Benford and Snow’s conception of resonance and describe it as occurring when “frames motivate action or cause [a] shift [in] beliefs” (p. 4).
The concept of credibility plays an important role in developing resonance as it establishes consistency and expertise related to the movement, as well eliminates any contradictions. The use of “empirical credibility” with frame theory helps to create resonance in that it makes a connection between the movement itself and what may be happening within the organization or its surroundings. Equally important is the perceived credibility of the individual(s) who are communicating the frame itself—the frame articulators. Here, resonance is often created through the frame articulator’s experience with the movement or the manner in which they create “narrative fidelity.” Narrative fidelity utilizes the concept of “cultural resonance” whereby, the frame articulator connects the movement to specific elements of the organization’s ideology (Benford & Snow, 2000).

Through this analysis, it is the hope that school leaders can learn effective ways in which superintendents have created resonance and, therefore, acceptance in the school district of a large-scale technology initiative. With this, frame analysis becomes a lens through which to view how district leaders establish meaning within a large-scale technology initiative with their constituencies. In turn, if superintendents contemplating a future technology initiative understand the meaning-making process that garners acceptance of technology initiatives, they can more effectively envision, design, and lead such initiatives in their own school systems.

**Strategic processes.** The development and diffusion of frame theory relies on specific tasks that propel the frame into motion. Strategic processes are often constructed by the frame articulator methods to mobilize individuals toward the movement. These processes are deliberately tied to the identified goals. Some strategic processes include
enlisting supporters and resources for the movement (Benford & Snow, 2000). Identifying strategic processes utilized by superintendents and educational leaders involved in large-scale technology initiatives may help create a more effective understanding of the use of frame theory to gain acceptance.

Constraints. Frame theory consists of many variables that may accelerate or impede its mobilization. As it is an ongoing process, it is often affected by various elements of an organization. Constraints are identified as political, social, cultural and even financial roadblocks that slow down the movement. An analysis of how superintendents and educational leaders maneuver around or through constraints will hopefully broaden the understanding of how superintendents gain acceptance of a large-scale technology initiative.

Frame diffusion analysis. The aforementioned aspects of frame theory allow for examination of the design, creation and meaning-making aspects of technology implementation. Frame diffusion analysis allows for examination of the widespread acceptance of the initiative in a district. Likening the implementation of large-scale technology initiatives to a social movement, these initiatives can be analyzed by using frame theory to conduct a frame diffusion analysis (Benford & Snow, 2000). Analysis of frame diffusion relative to technology implementation allows for discussion of how constituencies make sense of a technology initiative and how the movement of ideas, collective action frames, and practices spread throughout the school system. Frame diffusion analysis also allows for examination of how the initiative affects the diffusion of beliefs, objects, and practices in the system by way of strategic selection or adaptation, or the strategic fitting or accommodation of these practices in light of the technology
initiative and its impact. A clear connection between frame theory and technology leadership actions is evident in the prognostic and collective action aspects of frame theory and this study will focus on those two aspects of frame theory and their relationship to diffusion of the initiative across a school district.

Finally, analysis of frame diffusion will allow us to discuss frame alignment employed during the implementation, that is, the actions taken by those who produce and invoke frames in an attempt to connect these frames with interests, values, beliefs and those they seek to mobilize toward acceptance of the technology initiative (Snow et al., 1986; Williams & Kubal, 1999).

The aggregate of this analysis allows for detection of potential trends or patterns of acceptance gaining that potentially allow for greater resonance between constituencies and the initiative, thereby tracing levels of acceptance to the leadership actions that brought them forward (Benford & Snow, 2000). Further, analyzing such leadership action will allow for identification of which leadership actions and framing moved the technology initiative to acceptance in the schools and at all levels of the community surrounding the school district. For this analysis we will use the perspectives of the district leadership and those they name as critical to implementation of the technology initiative.

Ultimately, we hope to inform practice by creating thick, rich descriptions of superintendent leadership actions intended to bring about acceptance of large-scale technology initiatives and illuminate themes and patterns across case studies about the actions of superintendents who have gained acceptance for large-scale technology
initiatives in their school systems. The next chapter will describe the methods that we used for this study.
Chapter Three

Methodology\(^3\)

The aim of this overarching study is to describe what superintendents do to gain acceptance of large-scale technology initiatives. As described in Chapter 2, *Acceptance* means that a district has technology devices in the hands of students in a 1:1 fashion for some regular and reliable portion of their instructional program. To address this aim, a multiple-case study analysis of five central office-led large-scale technology implementations was conducted. This chapter describes the methods for this study.

Spokes of Related Study

Our research team conducted a group study of the work of the superintendent in gaining acceptance of large-scale technology initiatives. In addition to the overarching study, five individual studies based on the work of superintendents in gaining acceptance of large-scale technology initiatives were also conducted. These individual studies are referred to as “individual spokes” of study. For the overarching study and the individual spokes, the majority of the research conducted was simultaneous and collaborative. The research methods that were unique to individual spokes of study are addressed in Chapter 5.

The topics for the five individual spokes stemming from our overarching study of what superintendents do to gain acceptance of large-scale technology initiatives are:

1. The impact of the superintendent’s instructional vision on acceptance of large-scale technology initiatives.

\(^3\) This chapter was jointly written by the authors listed and reflects the team approach of this project: Anna P. Nolin & Henry J. Turner with Erik P. Arnold, Peter D. Cohen, Gina E. Flanagan
2. The impact of distributed leadership practices on acceptance of large-scale technology initiatives.

3. The impact of the superintendent’s technology infrastructure decisions on the acceptance of large-scale technology initiatives.

4. The impact of the superintendent's use of technology on acceptance of large-scale technology initiatives.

5. The impact of a school district’s collaboration practices and professional learning structures on acceptance of large-scale technology initiatives.

Table 1 (on the next page) illustrates individual areas of study and research questions.

**Design of Study**

To address our team’s overarching research questions, a case study methodology was employed. A case study is an empirical inquiry that “investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident” (Yin, 2009, p. 326). Case study methods are best for uncovering the “how” or “why” of events and are appropriate for this study because several of the research questions for our individual spokes of related study are “how” questions (Yin, 2009). Case studies allow us to explore and describe the complexity of contemporary situations without the ability to control behavioral events (Yin, 2009; Creswell, 2012). Specifically, a multiple-case study design was employed. While employing multiple-cases, across multiple interviewees, we were able to describe and compare the cases to enhance our understanding of the issue being studied (Creswell, 2012).
### Table 1

**Individual studies and research questions detailed in Chapter 5**

<table>
<thead>
<tr>
<th>Individual Study/Author</th>
<th>Research Questions</th>
</tr>
</thead>
</table>
| Framing Innovation: Does An Instructional Vision Help Superintendents Gain Acceptance for a Large-Scale Technology Initiative? (Flanagan, 2014) | • What is the instructional vision of superintendents who implement large-scale technology initiatives in a 1:1 or BYOD environment?  
• How does the superintendent connect his or her instructional vision with the implementation of technology within the district to all stakeholders?  
• How do district administrators make sense of the superintendent’s instructional vision for technology? |
| Framing Innovation: The Role of Distributed Leadership in Gaining Acceptance of Large-Scale Technology Initiatives (Turner, 2014) | • Who does a superintendent work with to gain acceptance of large-scale technology initiatives?  
• How do members of leadership teams interact with each other around large-scale technology initiatives?  
• How do members of a leadership team interact with each other around large-scale technology initiatives? |
| Framing Innovation: The Impact of the Superintendent’s Technology Infrastructure Decisions on the Acceptance of Large-Scale Technology Initiatives (Arnold, 2014) | • What factors are considered by superintendents in making decisions about technology infrastructure?  
• What factors are considered by superintendents in making decisions about funding the large-scale technology initiative?  
• How did the technology infrastructure or funding decisions have an impact on the perceived acceptance of the initiative? |
| Framing Innovation: The Impact of the Superintendent’s Attitude and Use of Technology on the Acceptance of Large-Scale Technology Initiatives (Cohen, 2014) | • How do superintendents and other district leaders use technology?  
• What are their attitudes about technology?  
• How do these attitudes influence their framing? |
| Framing Innovation: Do Professional Learning Communities Influence Acceptance of Large-Scale Technology Initiatives? (Nolin, 2014) | • What are the superintendent’s expectations around collaboration?  
• What is the relationship between district expectations for professional collaboration and acceptance of large-scale technology initiatives in school districts? |

A multiple-case study approach uses qualitative measures to build theory by linking “rich qualitative evidence to mainstream deductive research” (Eisenhardt & Graebner, 2007, p. 25). The rich evidence gathered are “individual cases [that] share a common characteristic or condition...[and] the more cases included in a study, and the greater variation across the cases, the more compelling an interpretation is likely to be”
(Merriam, 2009, p. 49). Thus, we were able to engage in cross-case analysis, drawing conclusions and generalizations based on how patterns held up or failed to hold up (Yin, 2009). For this reason, a multiple-case study on the workings of superintendents was necessary because little research exists describing how such leaders implement technology initiatives in their districts. Our study analyzed this unique time in implementation history—a period of potential interest to others engaged in or considering large-scale technology implementations.

Having detailed rationale for using the multiple-case study approach, the remainder of the chapter discusses the data collected, how the data was analyzed, and how we ensured the validity of the research. In what follows, we provide descriptive information about each of the study districts.

**Study Districts**

One individual state was chosen to provide a research site for two reasons: the state mandates a coordinated set of curriculum frameworks but large-scale technology initiatives remain locally controlled. Further, in the town structure of school governance, policies are made at the local level so that superintendents may champion large-scale technology initiatives, making district level leadership ideal for examination.

Districts were targeted in a manner that was purposive and criterion-based while seeking maximal variation within our district sampling. Researchers employed a criterion-based sampling approach (Creswell, 2011). Through this sampling method, participants were chosen using a predetermined list of potential characteristics. This selection process supported the building of theoretical insight using interview data (Eisenhardt & Graebner, 2007) and allowed analysis using the specific theoretical lens of
frame theory (Benford & Snow, 2000; Snow et al, 1986). Specifically, we sought to gather insights about superintendents and leadership teams who implement 1:1 device programs through the theoretical lens of frame theory. Maximal variation sampling was used as described by Creswell (2007), to the extent possible, within this theoretical sample, resulting in varied types of technology implementations at varying grade levels within the systems.

Five small and mid-sized Level 1 or Level 2 school districts implementing large-scale technology initiatives were selected for our study. In the state, 6% of public schools carry no accountability level, 2% are Level 4 schools, 15% are Level 3 schools, 54% are Level 2 schools and 23% are Level 1 schools. Level 3, 4 or 5 status schools, according to the Department of Elementary and Secondary Education, require intensive, mandatory state oversight, intervention, and restructuring (Department of Elementary and Secondary Education, 2012) and, therefore, were not prioritized for this study as such sites may have introduced undue complications to the study of the technology initiative. However, three months after we concluded our interviews in the district, the Madison School District dropped from Level 2 to a Level 3 system; because one of its elementary schools became Level 3, the state designates the entire district as such. This status change did not impact our study because notice of this status and its pending state interventions occurred after the conclusion of our research in the district.

Small and medium-sized districts were prioritized because of the desire to capture a more comprehensive examination of the role of central office leaders at the local level.

---

4 The state’s Department of Elementary and Secondary Education (DESE) ranks all public schools on a performance rating of 1-5. Level 1 schools demonstrate the highest achievement and level 5 districts are the lowest performing. Level 4 and 5 districts receive state-mandated and controlled involvement.
While many studies of central office leadership exist, the majority of studies describe large and urban systems (Hightower, 2002; Honig, 2003; Coburn, Bae, & Turner, 2008; Coburn, Toure & Yamashita, 2009; Coburn & Stein 2010; Honig & Venkateswaran, 2012); no studies, to our knowledge, examine the roles of central office staff in smaller districts. It is theorized that smaller districts employ central office staff who may be required to play more or varied leadership roles in systems; indeed, in these smaller districts, central office staff demonstrated more discretion and power to implement technology leadership decisions, thus making this study that much more descriptive of leadership actions.

At the time of this study, 30 school districts in the state contained large-scale technology initiatives, constituting 13.6% of the state’s total school districts. These districts were identified through an informal email survey of member districts in the state’s secondary administrator’s association, a large, powerful, and comprehensive professional association in the state. From those 30 school districts, 12 met size and accountability designation criteria. From that sample, sites were chosen based on the following criteria:

- Superintendent must have been a leader in a targeted school system implementing a large-scale technology initiative for the past two years.
- Superintendent must have been a leader in the system at the inception of district’s large-scale initiative implementation (on the ground in schools).
- Superintendent was willing to participate in the larger study.

Superintendents were contacted by phone; all superintendents contacted agreed to participate in the study.
The districts chosen and relevant criteria for inclusion in the study are detailed in Table 2. This table recounts district size, accountability level, the grade levels into which the large-scale technology initiative was implemented, the type of technology implementation, the size of the technology leadership team identified as responsible for implementing the technology initiative, and the approximate number of students involved in the initiative. The type of technology implementation included: district-provided device 1:1 models of technology deployment (DPD), district-sponsored lease-to-own 1:1 models (LTO), a bring-your-own-device model (BYOD) and a blended model combining LTO and BYOD.

Table 2.

Description of Study School Systems

<table>
<thead>
<tr>
<th>System</th>
<th>Accountability designation</th>
<th>System size in number of students</th>
<th>Type of technology implementation</th>
<th>Grade level of technology implementation</th>
<th>Size of technology leadership team</th>
<th>Approx. # of students involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams</td>
<td>Level 2</td>
<td>3600</td>
<td>District Provided iPads</td>
<td>Grades 1, 4-12</td>
<td>4</td>
<td>2700</td>
</tr>
<tr>
<td>Jefferson</td>
<td>Level 2</td>
<td>2900</td>
<td>District Provided iPads</td>
<td>Grades 9-12</td>
<td>3</td>
<td>770</td>
</tr>
<tr>
<td>Madison</td>
<td>Level 3</td>
<td>1000</td>
<td>Blended Design of DPD carts, Lease-to-Own and Bring Your Own Device</td>
<td>All grades (parent purchase dependent, carts at all schools)</td>
<td>5</td>
<td>990</td>
</tr>
<tr>
<td>Monroe</td>
<td>Level 2</td>
<td>2700</td>
<td>District Provided Mac Laptops</td>
<td>Grades 6-12</td>
<td>3</td>
<td>1500</td>
</tr>
<tr>
<td>Washington</td>
<td>Level 1</td>
<td>4400</td>
<td>Bring Your Own Device</td>
<td>Grades 6-12 (parent purchase dependent, carts at all schools)</td>
<td>8</td>
<td>1200-2000</td>
</tr>
</tbody>
</table>
Washington School District

Washington School District is in a suburban community outside of a major United States metropolitan city. Based upon the state’s school district accountability system Washington is considered a Level 1 school district. In the fall of 2011, the superintendent, Brody, and members of his technology leadership team began to plan for an initiative to allow students in the 6-12th grades to bring their own electronic devices to school. The members of the technology leadership team included principals, a network administrator, and school technology integration specialists. Pseudonyms for the participants of the technology leadership team are described in Table 3. In January 2012, Washington began their large-scale technology initiative. This program, sometimes referred to as Bring Your Own Device (BYOD), allowed students to use their personally owned devices in their classrooms and utilize the district wireless Internet connection. Students and teachers in the two middle schools and one high school participate in the initiative. The principal and building technology integration specialist work with teachers to integrate technology within the classroom. According to the district’s network administrator, in this district with 4400 total students, approximately 53% of them participate in the technology initiative—connecting their personal wireless devices to the district’s wireless network.

Adams School District

The Adams School District is in a suburban community outside a major metropolitan area and, based upon the state’s school district accountability system, is considered a Level 2 school district. In the spring of 2011, the superintendent, Norman, and members of his technology leadership team used money allocated from the district
budget to purchase tablets for all students at the district’s single high school. The members of the technology leadership team included the high school principal, the technology director, and instructional technology director. Pseudonyms for the participants on the technology leadership team are described in Table 3. Since the initial implementation in 2011, Adams School District has purchased more devices at the elementary and middle school levels with the goal that all students and teachers will have access to technology devices. Additionally, Paul, the high school principal, has moved into a central office position. Working with the high school principal, the technology director and instructional technology director have incorporated several strategies to provide professional development as well as communicate with the larger community, including a large focus on use of social media.

**Jefferson School District**

The Jefferson School District is in an exurban community between a major metropolitan city and a large city and, based upon the state’s school district accountability system, is considered a Level 2 school district. In the summer of 2012, new superintendent, David, and members of his technology leadership team, purchased iPads for high school students through money allocated through the high school new building project. Discretionary funds that accompanied the building project were allocated for device purchase. The members of the technology leadership team included the high school principal and the assistant high school principal. Since that time a technology director has been hired and contributes to the leadership of this initiative. Pseudonyms for participants on the technology leadership team are described in Table 3. During the final phase of the building project and technology purchase, the assistant
principal created what she referred to as “a vanguard technology team” of teachers to plan for the implementation of the initiative within the classrooms.

**The Madison School District**

The Madison School District is in a rural community comprised of four small towns. Based upon the state’s school district accountability system, it was considered a Level 2 school district during the time of the interviews. Since that time the district was identified as a Level 3 district. Around 2003, Bob, the superintendent, and Brett, the technology director, started an initiative to provide students technology throughout the district. This initiative has included the district using grant money to purchase technology; using money from a new building project, which consolidated four elementary schools; and creating a non-profit organization, which created a lease-to-own device program for parents. The members of the technology leadership team included principals, the technology director, the director for academics as well as the district’s grant writer/public relations director. Since the project’s inception, the district has experienced personnel changes including a change of technology director and the director of academics, who previously served as principal. Additionally, since the beginning of the initiative, Madison has purchased more devices at the elementary and middle school levels with the goal that all students and teachers will have access to technology devices. Pseudonyms for participants on the technology leadership team are described in Table 3.

**The Monroe School District**

The Monroe School District is in a suburban community outside a major metropolitan area and, based upon the state’s school district accountability system, is considered a Level 2 school district. In summer of 2011, Jackson started as
superintendent in Monroe and some planning for the technology initiative had already begun. Jackson’s predecessor, the district technology director, high school principal, and instructional technology specialist worked to conceptualize a program to provide all high school students and teachers with laptops. During Jackson’s first year as superintendent, the team continued to work on the program and the school committee approved funding for the devices; Jackson worked creatively to fund the initiative through operating funds and build understanding within the town around the initiative. In the fall of 2012, the high school began the laptop initiative. Two years later, members of the technology leadership team continue to work with teachers to provide professional development and integrate technology into classroom instruction. Pseudonyms for the participants on the technology leadership team are described in Table 3.
Table 3

*Pseudonyms for Interviewed Members of the Technology Leadership Team*

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Position</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brody</td>
<td>Superintendent</td>
<td>Primary Leader/Key Framer</td>
</tr>
<tr>
<td>Ethan</td>
<td>Former Middle School Principal</td>
<td>Secondary Leader</td>
</tr>
<tr>
<td>Grady</td>
<td>Middle School Principal</td>
<td>Secondary Leader</td>
</tr>
<tr>
<td>John</td>
<td>Network Manager</td>
<td>Secondary Leader</td>
</tr>
<tr>
<td>Rylan</td>
<td>Technology Integration Specialist</td>
<td>Secondary Leader</td>
</tr>
<tr>
<td>Ava</td>
<td>Technology Integration Specialist</td>
<td>Secondary Leader</td>
</tr>
<tr>
<td>Caitlin</td>
<td>Technology Integration Specialist</td>
<td>Secondary Leader</td>
</tr>
<tr>
<td>Grace</td>
<td>Technology Integration Specialist</td>
<td>Secondary Leader</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Position</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Position</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Position</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Position</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Position</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 describes the members that were interviewed for this study, which was the largest method of data collection. As described in the limitations section, some district members of the technology leadership teams were not interviewed. The next section discusses how our study data was collected.
Data Collection

Interviews and document review were the data sources for our study. The identified superintendents (i.e., one per district) from the selected systems were interviewed first. Those individuals named by the superintendent as members of the district’s technology leadership team involved in gaining acceptance of the district’s technology initiative were next interviewed, employing a snowball sampling method. While interviews were the primary source of data, a document review was also conducted. If superintendents or team members mentioned documents that were key to the technology initiative or to gaining acceptance for the initiative, they were aggregated, coded and analyzed using the same system as interview data. This section further explains the data collection process.

Interview Sample

In each of the selected school systems, using a snowball sampling procedure, all individuals named by the superintendent as holding leadership roles within each district’s technology initiative were interviewed. This type of snowball sampling is defined as "a form of purposeful sampling that typically proceeds after a study begins and occurs when the researcher asks participants to recommend other individuals to study" (Creswell, 2011, p. 217). Additionally, this sampling method allowed researchers to describe and understand the leadership team and its implementation dynamic. Table 3 details who was interviewed for this study.

In most cases, these interviews resulted in the team members naming each other as key to the initiative—corroborating the individuals suggested by the superintendent. In all districts, additional people were mentioned in the interviews, but were not
interviewed. In four districts (Washington, Adams, Jefferson and Monroe) these individuals were not mentioned by the superintendent, but were identified as important to the initiative by other leadership team members. We inquired about the importance of the person to the implementation to the superintendent who, in each case, verified that the person was not important to the initiative. Since the purpose of our study was to understand the role of superintendents and technology initiatives, the superintendent’s assessment and vision of the team and initiative dictated that these individuals were not important to the study. In Madison, the superintendent mentioned one technology team member (new Director of Technology) as he described the 2014 state of the technology initiative; however, the individual came into her position several years after the initiative was in place within the district and was not a part of the initial framing and roll-out of the initiative in any way.

Interview Procedures

The five researchers collaboratively conducted interviews in the following manner. Between June and November of 2013, the research team, working in pairs, conducted one-hour, in-depth interviews as described by Yin (2009), with the five superintendents and those identified by the superintendent as key to implementation of the technology initiative. The interviewing procedure was piloted with three superintendents who work in school districts with 1:1 initiatives in their districts, but were not included in the formal study.

After the pilot work, our team conducted 23 interviews. An interview guide was used for all interviews (see Appendix E for interview guide and questions), which included notes to the interviewer, including: (a) a protocol for superintendents, (b) a
separate protocol for non-superintendents, (c) follow-up prompts and probes for both types of interviews, and (d) a format for field notes. To further ensure consistency in interviewing, two interviewers attended and took notes during each interview, relying on Seidman (2006) for guidance in interviewing technique. Interviewers were encouraged to ask follow-up questions when confused or lacking understanding of what was said and were asked to explore and ask for more information about areas brought up by the participant in keeping with interview probes related to the larger study and individual spokes of study.

Interviewers maintained the semi-structured interview protocol predetermined by the group and linked to our theoretical framework and spoke areas. The interview guide itself was arranged and guided by the larger study and the individual spokes. Components of frame theory also guided the organization of the interview questions (See Appendix E for interview protocol and guide), seeking to determine if a relationship existed between the topics of individual spokes and the superintendent’s leadership actions relative to the framing of the initiative to gain acceptance in the community.

**Documents**

Document review of district strategic plans occurred as a way to validate information obtained in the interviews, but were not used to create generalizable theory on their own (Yin, 2009). The document review included district web posts/sites, district goals and/or school plans as well as technology planning documents, technology deployment and funding documents. These documents were chosen based on how and whether the superintendent and leadership team discussed the documents as part of their work to design, prepare, implement and communicate the aims of the technology
implementation. District memos, websites, curriculum documents, presentations, and other email or written communication including budget documents were also reviewed to determine leadership actions of the superintendent that may have contributed to acceptance of the technology initiative in the system. A total of twenty documents were mentioned by study participants during interviews and were therefore analyzed. Table 4 describes the documents analyzed for this study.

Table 4

Documents Reviewed by District

<table>
<thead>
<tr>
<th>Adams</th>
<th>Jefferson</th>
<th>Madison</th>
<th>Monroe</th>
<th>Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central office leaders’ blogs (3)</td>
<td>School iPad program implementation documents</td>
<td>School district goals</td>
<td>School district goals</td>
<td>School district goals</td>
</tr>
<tr>
<td>School district goals</td>
<td>School district goals</td>
<td>School district website</td>
<td>School district website</td>
<td>School district website</td>
</tr>
<tr>
<td>School website</td>
<td>School website</td>
<td>Non-profit technology purchase and lease organization details</td>
<td>Syllabi for superintendent’s technology course</td>
<td>Internal newsletters to staff (3)</td>
</tr>
<tr>
<td>Twitter feeds of leadership team members (2)</td>
<td>School website</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data Analysis

Detailed in this section are the specific methods used to analyze the data obtained for this study including how interview data was tracked and organized, and how transcripts were coded. Our thinking was tracked in a variety of methods as we went through a three-step analysis cycle. Miles and Huberman (1994) describe three steps in analyzing data for a multiple-case study approach that were used for this study: (a) early steps in analysis, (b) within-case analysis, and (c) cross-case analysis. Each phase of analysis required the team to code and analyze cases in pairs and then come together for group analysis. Informal research journals, individual analytic memos, and group interim
summaries assisted in this process and are all defined in this section as are code definitions and coding procedures. The three phases of analysis served as a starting point for researcher work, beginning during data collection and unifying the researchers through the coding and analysis phase of working with the data.

**Tracking and Organizing Researcher Thinking**

We used unified methods to track and organize thinking and note taking throughout the study. As noted in the interview guide (Appendix E), we took notes during the interview process as they related to the interview experience itself or to help clarify ideas stemming from the interviews. These notes served as a companion to the oral interviews, focused on further revealing the central phenomena being studied, or illuminated information relative to the individual spokes of inquiry as they arose in the interviews. These notes were the foundation for the manner of tracking and organizing our thinking. This section describes how thinking and note taking was tracked and organized in order to be useful to the analysis process.

**Informal research journals.** As described by Emerson, Fretz & Shaw (1995), researchers should strive to capture their “daily ruminations” from each aspect of their research in the field. To capture these ruminations or jottings and put them into a meaningful context, researchers wrote musings, insights, descriptions and brief summarizing paragraphs in informal research journals as a means to track thinking and aid in interpretation of data. The use of such journals allowed us to remember impressions and insights when case studies were later analyzed and composed.

**Analytic memos.** Each team participant kept a record of any memos, reflections or thoughts that emerged at any time during the entire research, data analysis and
interpretation process. These memos followed the guidance used in Saldana (2009), which suggests that researchers write about the following: (a) How the researcher personally relates to the participant’s phenomenon; (b) the study’s research question; (c) code choices and operational definitions; (d) possible networks, links, connections, overlaps, flows among patterns, categories, themes and concepts; (e) emergent theory; and (f) problems within the unfolding study and future directions for the study.

Saldana also advises that the notes themselves can be useful in later coding and theming processes as they can be coded and categorized for further review. Analytic memos “reveal the researcher’s thinking process about the codes and categories developed thus far,” (Saldana, 2009, p. 157). Additionally, memos, intended for use here, are “somewhat comparable to researcher journal entries or blogs—a place to ‘dump your brain’ about the participants, phenomenon, or process under investigation by thinking and thus writing and thus thinking even more about them” (Saldana, 2009, p. 32). Analytic memos were used to mesh our work and thinking and to inform the writing of interim summaries intended to move analysis toward agreed upon findings.

**Interim summaries.** The creation of interim summaries described by Miles & Huberman (1994) took place one-third of the way through analysis. The summaries were shared among our team as well as with our dissertation advisor (see Appendix F for interim summary format). The process of summary writing and sharing was designed to demonstrate missing pieces in the research and to begin to address and identify emerging patterns. Interim summaries were an opportunity for sensemaking within the data throughout the data collection process. Themes from the data were documented in the summaries and both connect and utilize the writings found in the analytic memos written
immediately after time in the field. Deeper coding and theming (Saldana, 2009) of the data occurred at this stage and was taken on again in the cross-case analysis. Themes emerged relative to the aims of the larger study and its sub-questions in relation to the researchers’ individual spokes of inquiry.

**Coding**

We employed a collaborative coding process throughout the study (Saldana, 2009). The team practiced the coding and analysis procedure detailed in the next sections using the pilot interview transcript data and then used the exact same process to code the actual interview transcripts. This section demonstrates how study analysis and coding worked together to deepen and sharpen our understanding and serve as an overview of the component parts of coding employed for analysis.

A “code” in a qualitative inquiry is a word or short phrase that “symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldana, 2009, p. 3). In this study, codes were markers for the presence of leadership actions, framing activity, and acceptance of the technology initiative. In the related individual spokes of this research, codes represented our individual research interests and how they related to framing actions by the superintendent, allowing the studies to work together to provide a frame theory analysis of leadership through five lenses. This section details coding procedures for the larger study; individual studies detail tailored coding and analysis procedures (see Methods sections of Chapter 5 submitted by each researcher).

A “start list,” or provisional set of codes, is a list of letter codes used to symbolize ideas around which the research team wants to unearth further thinking. The codes used
in this study were tested with the pilot interviews and were then revised and refined as the study progressed and ideas and concepts evolved for the research team (Miles & Huberman, 1994). Frame theory components guided the provisional “start list” procedures and served to anchor the study by revealing descriptions of certain leadership actions and ways in which superintendents framed large-scale technology initiatives. Sub codes were added after initial coding had been conducted and analysis of the data had begun. Table 5 (on the next page) indicates how the prognostic, diagnostic and collective action frames were coded relative to leadership actions in a system; sub codes were added one-third through the coding of superintendent transcripts based on discernible patterns from initial coding and were further refined with sub or “child” codes.

We employed a collaborative coding and analysis process using the shared interview transcripts. This coding process required each researcher to take a copy of a single interview transcript and apply agreed-upon provisional codes (Table 5). In a second reading of the transcripts, the researchers then collaboratively developed new codes based on his/her individual transcript with the aims of the larger study in mind. Then, with newly generated codes, we created agreed-upon code definitions in a code dictionary. This process allowed for greater alignment and unity in coding across our research team.
Table 5

*Initial Set of Provisional Codes and Revised Sub Codes*

<table>
<thead>
<tr>
<th>Description</th>
<th>Broad Code</th>
<th>Sub Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core framing tasks</td>
<td>Description</td>
<td>Broad Code</td>
</tr>
<tr>
<td>Frame theory constructs describing how movements are initially framed for implementation and communication.</td>
<td>Framing Orientation (FO)</td>
<td>D - Diagnostic Framing, P - Prognostic Framing, M - Motivational Framing</td>
</tr>
<tr>
<td>Resonance</td>
<td>Description</td>
<td>Broad Code</td>
</tr>
<tr>
<td>Key component of frame elaboration—reason that a particular initiative or movement begins to resonate with constituencies involved in a social movement.</td>
<td>Resonance (RE)</td>
<td>CL - Connection to Learning, IC - Individual Credibility, EI - Empirical Credibility, NF - Narrative Fidelity</td>
</tr>
<tr>
<td>Strategic processes</td>
<td>Description</td>
<td>Broad Code</td>
</tr>
<tr>
<td>Key aspect of frame theory describing how movements are elaborated and diffuse through a community/constituency.</td>
<td>Strategic Processes (SP)</td>
<td>PDF - Professional Development (formal), PDI - Professional Development (informal), PM - Political Maneuvering, PILOT - Piloting, LOG - Logistics Planning, PR - Public Relations, ES - Equipment Selection, RES - Research, KP - Key Players, USE - Expectations for technology use, Staff - Staffing</td>
</tr>
<tr>
<td>Constraints</td>
<td>Description</td>
<td>Broad Code</td>
</tr>
<tr>
<td>Constraints</td>
<td>Constraints (CO)</td>
<td>P - Political Constraints, S - Staffing, F - Financial Constraints, C - Cultural Constraints, T - Time and/or Competing Interests, L - Leadership</td>
</tr>
</tbody>
</table>

Interview data was then collaboratively re-coded with newly refined and agreed upon codes; this process was practiced until a satisfactory degree of “inter-coder agreement or interpretive convergence” was achieved (Saldana, 2009, p. 27). Our team sought 85% convergence as an informal measure of skill and unity before solidifying codes and procedures. After that process, the group created a coding manual with the agreed upon definitions and example quotes for our use in coding all subsequent data. The dictionary was updated, as necessary, throughout the study and analysis process. See
individual spoke methodologies for where individual researcher practice picks up from the coding and analysis of the data sets described here.

In the *early steps in analysis* phase we examined the interview data while the interview occurred, and, thereafter, applied our provisional start-list codes (Table 5). After the first reading/analysis, new codes (initial coding) pertaining to the framing actions of the superintendent with his leadership team emerged and required integration, reorganization and creation of sub or “child” codes within our starting codes (also detailed in Table 5).

Throughout the analysis phase, the processes of both coding and analysis were fluid, iterative, and recursive. Therefore, analysis occurred simultaneously with coding procedures and informed next steps in processing the study’s collected data. Researchers revisited the data to write, rewrite and rethink findings as the data and codes allowed for new insights. Specific procedures to guide this process for both coding and analysis are defined below.

As noted in previous descriptions of frame theory, it was theorized that frame theory would assist in analysis in this study of superintendents and how they gain acceptance for large-scale technology initiatives. Frame theory served as a lens to view and describe the manner in which superintendents and their leadership teams worked to identify problems in a system, propose and develop solutions to those problems, and move others to collective action to solve them. In the case of this study, it also included use of different leadership actions to frame how technology was used in the district to both solve problems and mobilize communities to support learning in new ways.
The new codes, once applied, allowed our team to detect patterns within and across cases. Identifying patterns emergent from the codes was used to: (a) search for explanations and causes in the data, (b) examine social networks and patterns of human relationships, (c) form theoretical constructs and processes, and (d) unearth development of major themes from the collected data (Miles & Huberman, 1994, p. 69). Determining the code patterns helped to organize the larger body of data. The pattern of codes then became a “stimulus to develop a statement that describes a major theme, a pattern of actions, a network of interrelationships, or a theoretical construct from the data” (Saldana, 2009, p. 154). Categories emerged for analysis and probing/connecting to other ideas. Once larger study patterns were identified, the group conducted a data meeting and crafted a second interim summary, again, theming the data based on new ideas and patterns. Thereafter, our team worked individually to code for constructs for individual spokes of research using codes specific to researcher interest areas (see Chapter 5 for how individual research extends the larger study). Each researcher then conducted within- and cross- case analysis relative to his/her individual research spokes.

**Developing and Analyzing Cases**

This study employs early analysis, within-case analysis, and cross-case analysis of collaboratively and individually coded data. From the collaboratively coded data, themes emerged that allowed for the description of leadership that helped to gain acceptance for large-scale technology implementation in school districts. Theming of the data first occurred for the study as a whole and also included researchers moving to individualized areas of research. As detailed earlier, themes were developed and refined throughout the coding process. Provisional codes were reviewed and reworked as patterns emerged
from the transcripts. Researchers identified broad emerging categories of ideas from the early coding and created more detailed and descriptive codes. The team then developed phrases that captured the leadership actions of the superintendent and his team. Saldana calls this “process coding” and indicates that this type of coding demands a sifting of the data and codes to date to create phrases (Saldana, 2009, p. 77). This process allowed researchers to describe the central phenomena and answer the research questions relative to the theoretical framework (Saldana). Examples of such phrases included “engaging in strategic processes,” and “contended with constraints.” These phrases eventually emerged as shortened descriptors of key findings from the study.

As code patterns within and across cases began to emerge from the transcripts, researchers recognized the need to create more detailed and descriptive codes to describe these broad pattern areas. For example, the area of “strategic processes” was repeatedly coded and it became clear that the strategic processes code area could be broken down into many sub code areas such as “professional development,” “equipment selection,” “key players,” and “piloting.”

It was theorized that within all phases of coding, a potential link between superintendent actions and frame theory might exist. In seeking to match superintendent actions with core frames, we identified what frame theorists call degree of resonance (Snow et al., 1986; Benford & Snow, 2000) within the technology initiative. Several common actions taken by superintendents to frame the initiative emerged from this study; these actions are described as findings in Chapter 4. However, some actions created more resonance within the initiative. During within-case analysis, coding was examined, even in the earliest stages, to reveal that the frequency of codes indicated
which superintendent leadership areas/activities were most frequently employed or were identified as important by interviewees. Certain codes were identified that matched more frequently to prognostic and/or collective action framing that also brought the greatest amount of “resonance” to interviewees’ understanding of the technology initiative. For example, Norman, the Adams superintendent, crafted a prognostic frame that likened 1:1 technology implementation to use of electricity or other utilities in the district. All interviewees in his district described Norman’s way of framing the initiative as a moment where the technology initiative gained momentum or where they gained understanding of the importance, logic, and power of the movement. Resonance moments like this one and others were coded for (a) the superintendent’s action, i.e. “strategic process”; (b) how the superintendent framed them, i.e. “technology is the next utility”; and (c) whether and how participants described the action and framing as “resonating” or building understanding and movement around the initiative. We examined all places of overlap between framing and resonance. The team was able to identify that the more frequent the overlapping coding, the more present the leadership action relative to solving problems or moving to collective action.

These areas of intensity provided greater resonance and yielded insight into the key actions that allow superintendents to gain acceptance for large-scale technology initiatives. Examining patterns of coding and frequency of coding allowed for the development of case analyses. Individual research procedures for analysis are detailed in Chapter 5; the workflow of coding and analysis for both the larger study and individual studies is detailed in Figure 2. This section further explains within-case and cross-case analysis procedures.
Within-Case Analysis

The next step of this process was *within-case analysis*. The purpose of this level of analysis was to allow us to explore, explain and predict areas of interest within each case. By analyzing each case and its coding structure individually, we studied the unique aspects of interaction between superintendents, their leadership team and their districts. With this analysis we were able to make connections between their patterns of interaction and the framing of the district’s technology program as evidenced by the emergent coding patterns in the transcripts and documentation. For example, in the Washington system, all interviewees mentioned the teaching with technology graduate course taught by Superintendent Brody as key to advancing the initiative in the system. This pattern of discussion created a topic around which coding was then more closely examined. Evidence of how acceptance was achieved relative to the superintendent’s framing
actions, could, therefore, be described within each case as a result of tracking these descriptions across participant transcripts within each district.

**Cross-Case Analysis**

Cross-case analysis allowed the researcher team to explore and describe connections across the cases and coding patterns linking all of the transcripts/school sites. Through this analysis, we were able to make generalizations across five cases about how the interactions between superintendents and their leadership teams influenced the acceptance of large-scale technology initiatives in a manner that was more generalizable for practitioners. For example, as noted in the prior example about the Washington district and the superintendent teaching a course identified as key to moving the initiative forward, this same professional development trend was noted in three other study districts. The possible resonance of this superintendent action was noted after the strong impact this action had within the Washington district, but then was further identified in other districts—picking up the pattern first revealed in Washington. Informal research journals, interim summaries, and the researchers’ analytic memos generated throughout the early and within-case analysis/coding process, proved helpful in conducting and tracking this kind of analysis, especially when using five researchers in the process. From this analysis, theory emerged from the larger study and areas for further exploration in the individual spokes of study were identified.

**Thematic Conceptual Matrix and Graphic Illustration of Findings**

A thematic conceptual matrix described by Eisenhardt (1989) and Miles & Huberman (1994) is a visual display used in a research study to help link together items that logically go together and is recommended when a series of research questions are
attached to a study. Given the varied spokes of inquiry linking to the overarching research study question related to acceptance, we sought to create a thematic conceptual matrix to map findings and give them “conceptual coherence,” both within-case and across cases (Miles & Huberman, p. 126-132). Within our multiple-case study, conceptual ideas emerged and researchers had to learn how those ideas connected and would constitute a useful addition to this area of research and practice. The core framing tasks of prognostic, diagnostic and motivational framing were contrasted and mapped relative to strategic processes and constraints that emerged within districts. These ideas were mapped and organized several times throughout the coding and analysis process relative to the leadership actions taken by superintendents during the technology initiative; therein, trends within each case were described and organized. This matrix also allowed for analysis and organization under the areas of frame theory within individual spokes of inquiry across the five cases in a similar fashion. The matrix was then used to create a graphic representation of the research findings to aid in conceptual understanding of research findings (Figure 3). The thematic matrices acted in concert with the memos, journals, and interim summaries to build coherent theory and ensure a core unity of understanding among the researchers.

Limitations/Delimitations and Validity/Reliability of Research

This chapter discussed the methods that were conducted for the larger study as well as for the individual spokes. Limitations, validity and reliability of the methods were considered throughout the process. This final section of methods discussion relies on the advice of Miles & Huberman (1994) relative to the validity and reliability of methods that advises researchers to check for representativeness of the data relative to the phenomena
by “checking for researcher effects…triangulating across data sources, and deciding
which kinds of data are most trustable” (p. 263). This section describes procedures
employed to increase validity and reliability of the study and will discuss the limitation
and delimitations.

Limitations and Delimitations

This study was limited to Level 1 and 2 school systems, as described by the state’s
system of leveling of school district performance. This study delimited the inclusion of
urban/large systems or Level 3 or 4 status systems, due to potential complicating factors
that these systems bring (and possible restructuring/turnaround mandates imposed on
them). However, Level 1 and 2 school systems comprise 77% of all of the state’s school
systems and the descriptions recorded here should remain applicable to a wide variety of
school systems within the state and country. The primary data set was obtained through
interviews and is therefore limited; all information was self-reported and reliant upon
participants’ memories of the initiative’s start years earlier. Nonetheless, participants
relayed common narratives of the implementation and leadership actions of the
superintendent.

The study sample may be limited as we purposefully chose only to study successful
implementations of large-scale technology initiatives, limiting the generalizability of our
results. Finally, the snowball sampling procedure was potentially biased and limited in
that some of the key players named as central to the implementation were not always
corroborated by other members of the leadership team or the superintendent. Allowing
the superintendent to name additional interviewees per the snowball sample methodology
meant that those involved may have been more loyal and supportive of the initiative and
superintendent, and therefore, resonance and acceptance may have been overly heightened or described in ways that do not reflect reality across districts. The sample may be, therefore, skewed toward certain circles of individuals in the district. Such a sampling procedure may have limited the data collection’s breadth and failed to identify variability or voices of criticism and dissention that may exist within the initiative and district; however, these limitations did not hamper the descriptions of how superintendent actions and work with identified leadership teams occurred.

**Validity**

This section explains how we worked to ensure internal and external validity in this study. To address potential threats to internal validity, we resisted making premature or incomplete inferences related to naming findings during analysis. For example, throughout the research process, we resisted a tendency to seek to name findings for the larger study that confirmed the hypotheses of our individual studies. Collaborative analysis of data and constant questioning of assumptions in team meetings allowed us to resist the urge to simply identify spoke-related findings; instead, we had to be open to a wider range of findings relative to framing that may or may not have linked to our individual studies. To test the explanations of the findings in the study, we adhered to strategies such as “ruling out spurious relations, checking out rival explanations and replicating findings” (Miles & Huberman, 1994, p. 263). Case analysis meetings among the research team also allowed us to craft both interim summaries and a thematic conceptual map. In conducting such meetings and creating these products, we (a) tested the strength of ideas, (b) reduced the likelihood of jumping too quickly to create causal relationships and (c) reduced the likelihood of jumping to illogical or weak connections.
within and across the data by seeking rival explanations for seemingly causal relationships. Additionally, using the multiple-case study data, we found patterns in cross-case display and tracked those patterns carefully through all of the cases to see if the patterns were repeated, thus increasing validity through data corroboration (p. 273). In each of the study interviews, patterns that emerged in earlier interviews were verified through new interview, coding and analysis procedures, tracked in analytic memos, and discussed and examined by our research group.

The interviews, as well as coding and analysis practices conducted in pairs, helped to address the above noted internal validity threats or biases inherent in one researcher’s ideas or another’s interpretive slant. After each interview, we created individual analytic memos; we wrote these memos as we left the field, later comparing them with the memos of our research teammates, which allowed for the drafting of collaborative interim summaries (Miles & Huberman, 1994). Partner perspectives on interview data and their meaning helped to avoid common research pitfalls such as generalizing from non-representative events and drawing inferences from non-representative processes (p. 264). Further, this strategy, as well as working to avoid generalizing by using outlier cases and seeking contrasting cases within the study sample, (districts with variance in technology initiative or in district features within our selection parameters) worked to strengthen the trustworthiness of the study. Multiple-case study analysis was used to address threats to the external validity of this study (Merriam, 2009) using the strength of five cases instead of telling the story of only one technology implementation.

Due to the study’s relatively small sample size, we are limited by how much we can generalize from this study. Nevertheless, within this limitation, specific actions were
taken to ensure external validity. According to Merriam (2009) external validity relates to how the findings of a study can transfer to other situations. In other words, external validity equates to a study’s potential for generalizability. One way to achieve external validity through case study research is through rich, thick description, which is a strategy that uses “description of the setting and participants of the study, as well as a detailed description of the findings with adequate evidence presented in the form of quotes from participant interviews, field notes, and documents” (Merriam, p. 227). This study’s description of districts and use of quotes and evidence in the findings section served to strengthen validity. A final strategy used to achieve generalizability was the use of Maximum Variation, which was used to carefully select districts to ensure a range between the studies. To ensure maximum variation we studied five districts with distinct characteristics in terms of: (a) device use (tablet, laptop, and mix); (b) initiative (BYOD, 1:1 and hybrid); and (c) demographics (rural, suburban and exurban).

This format of research strengthens the validity and applicability of our findings across varied settings to be more widely useful to educational leaders of all types and all school system demographics. Additionally, among the multiple-cases being studied, outlier, surprise, and negative case evidence was carefully scrutinized for effects on pattern and logic making within the findings, further strengthening the validity of the data.

**Reliability**

Reliability is achieved when the steps of a study are clearly delineated and can be repeated with the same results and when the data emergent from the study “can be buttressed from several independent sources” (Miles & Huberman, 1994, p. 273). To
create such buttressing of the data, five researchers executed this study—gathering data and conducting analysis in collaborative pairs and groups. We employed one unified set of overarching research methods to conduct the study; methods and steps of the research process varied only in the coding and analysis phase of our individual spokes of research in the final phases of analysis. Nonetheless, the steps for executing the larger study and the steps for our individual studies were clear, specific, and followed the same format of execution. A strong evidence and analysis chain of development was kept in the form of our researcher memos, team and individual interim summaries, and the conceptual matrix in order to document study processes as detailed in the within and cross-cases analyses sections of this chapter.

As also noted in Yin (2009), “the most important advantage presented by using multiple sources of evidence is the development of converging lines of inquiry, a process of triangulation and corroboration” (p. 115). Yin goes on to discuss the following four types of triangulation in doing evaluations, as noted in the work of Patton (2002): “(1) of data sources (data triangulation), (2) among different evaluators (investigator triangulation), (3) of perspectives to the same data set (theory triangulation), and (4) of methods (methodological triangulation)” (Yin, 2009, p. 116).

As a five-person research/evaluation team, we used collaborative interviewing and coding to strengthen examination of interview transcripts and documentation from the school district to employ data triangulation. These collaborative actions combined with study design sought to address recommendations by Yin (2009). Collaborative interviewing, coding and analysis sought to provide investigator triangulation. Finally, unified methodology for the overarching study combined with coordinated individual
research coding and analysis actions sought to meet expectations for methodological triangulation.

**Researcher Bias and Assumptions**

Bias and assumptions may exist within this research study in the following ways. We made assumptions that participants were honest and forthright, and the events of technology implementation are as they describe them. Our doctoral student research team is comprised of central office and building-level administrators with professional experience in implementing technology initiatives. A place of potential researcher bias relates to our professional roles as instructional and technology leaders in our own school systems. In some way or another, each of us has led, participated in, or extensively researched the implementation of technology in his/her own respective school systems, and, as such, has had to justify its value in an advocacy stance. Thus, inherent and strong biases based on our roles and experiences relative to technology integration were minimized through collaboration among the research group and interaction with our dissertation committee.

As researchers who work within the fields of educational leadership and technology implementation, the team recognizes that these biases must be minimized in order for the study to be meaningful to educational leaders. As a group of researchers, even with attempts to unify this work and thinking through the use of interview protocols, scripts, provisional coding, collaborative coding and analysis, as well as the iterative process of shared analytic memo and interim-summary writing, this work will never be free from flaws. In addition, Merriam (2009) indicates that it is often thought that a case study is inherently more biased than other types of research because cases are selected
based on researchers’ prior notions. We acknowledge that such bias may exist in case selections, although the overall study design seeks to reduce the impact. In employing this process, we uphold the second and third recommendations for triangulation as described by Yin (2009).

Additionally, we could be biased in two additional areas in this research: (a) by way of an over reliance on frame theory as a theoretical lens and (b) by not entertaining the potential that superintendents do not play a significant role in implementation of technology initiatives in the district. To address these potential biases, data was coded in a manner that allowed for the potential that frame theory might not be an accurate lens through which to analyze the actions of some school systems. Additionally, the multiple-case study approach was employed to limit these biases and allow for multiple leadership dynamics to exist within the study rather than just focusing on one superintendent and leadership team/technology implementation.
Chapter 4

Findings

The overarching study sought to answer the question, “What do superintendents do to gain acceptance for large-scale technology initiatives.” In order to do so, 23 central office and school administrators in five school districts were interviewed for this study. Although superintendents were the main source of data, they also identified technology leadership team members involved in the initiative who were interviewed as well. A review of pertinent documents was also conducted. The technology leadership team members identified by the superintendents held positions such as: principal, assistant principal, technology director, network director, technology integration specialist, and director of academics. As indicated in Table 2 of Chapter 3, the districts had the following types of technology initiatives: (a) BYOD in the Washington School District, (b) district-provided 1:1 iPads in the Adams School District, (c) district-provided 1:1 iPads in the Jefferson School District, (d) blended design in the Madison School District that included a district sponsored lease-to-own, and (e) district-provided 1:1 laptops in the Monroe School District.

In addition to the five thematic studies addressed by the research team, frame theory was applied to the interview data as an aid in exploring how superintendents gain acceptance for these technology initiatives. It was found that a number of the superintendents’ actions were consistent with aspects of frame theory and led to three central findings: (a) superintendents achieved resonance through leadership actions that

---

5 This chapter was jointly written by the authors listed and reflects the team approach of this project: Erik P. Arnold & Anna P. Nolin with Peter D. Cohen, Gina E. Flanagan, Henry J. Turner
were consistent with prognostic and motivational framing, (b) superintendents considered constraints the initiative might face, and (c) superintendents developed strategic processes to gain acceptance for the initiative. The next section discusses the three findings in detail and the findings are presented in keeping with Bem (2003) in terms of most general to most specific in nature.

**Achieving Resonance**

We found that superintendents achieved resonance through leadership actions that were consistent with prognostic and motivational framing, but not diagnostic framing. Frame theory identifies resonance as a component of framing acceptance relative to social movements (Benford & Snow, 2000). Superintendents hope that everyone understands that initiatives they promote are important for the district. The degree to which superintendents are able to motivate action or change opinions to support the initiative is what frame theorists refer to as resonance (Park, Daly, & Guerra, 2012). The methodology we used to identify points of resonance is described in Chapter 3. As discussed in Chapter 2, Benford and Snow (2000) have identified three core framing tasks in frame theory: diagnostic, prognostic, and motivational framing. Achieving resonance would indicate that the diagnostic, prognostic and motivational framing actions by the superintendents were effective (Benford & Snow, 2000). Analysis of transcript and document data revealed that the superintendents in this study created resonance through their prognostic and motivational framing of the large-scale technology initiative, but only the actions of one superintendent were consistent with diagnostic framing. Each of these framing processes are described below.
Prognostic Framing

Prognostic framing, described in more detail in Chapter 2, works to create a solution to a problem through goals and a structured plan (Coburn, 2006). Accordingly, we analyzed data to uncover the goals of superintendents around large-scale technology initiatives such as: 1:1, BYOD, and Blended initiatives.

Consistent with prognostic framing, we found that all superintendents had goals for what they hoped the technology initiative would achieve. One goal that was common to each district was to provide greater access to mobile technologies. Examples from the Adams and Washington school districts are representative of this goal. In addition to data from interviews, documentation from Adams states, “Students will have a mobile device to use throughout the school day and at home, [and this will] allow for the extension of learning beyond the classroom walls.” The Washington superintendent, Brody, saw the BYOD initiative as providing students and teachers that “just-in-time access to devices,” so teachers no longer had to worry if the computer lab was available or not.

All superintendents believed that if this ubiquitous access to technology was achieved, teaching and learning would improve in the district. Bob, the superintendent from Jefferson, indicated, “a big focus...was on student engagement and higher-order thinking skills, and making that switch from teacher-directed instruction to more student-directed learning.” He argued that “going 1:1 was really about getting ahead of the curve” and he wanted to make sure that “every student has access consistently to very rich

---

6 For this study, the following terms will be defined as: (a) all – the characteristic was present in each district, (b) nearly all – the characteristic was present in at least three of the five districts, (c) do not consider or not present – the characteristic was identified in no more than one district.
dynamic materials and curriculum.” Greater access to learning, regardless of whether the students were in school, at home, or anywhere else that had free Wi-Fi access, was a common goal of the large-scale technology initiatives; this is frequently referred to as “learning without walls”. While the actions of superintendents surrounding the technology initiative to develop goals, and a plan for achieving those goals was consistent with prognostic framing, motivational framing was employed by superintendents in order to communicate support for the goals and plans of the large-scale technology initiative.

**Motivational Framing**

Motivational framing is how “the rationale for action is articulated” (Park, et al., 2012, p. 4). We found that communication from the superintendent to his leadership team, the faculty, parents, students, elected officials, and the public was important in building support for the initiative.

In general, superintendents and technology leadership team members built support for the initiative by communicating their goals at parent informational meetings, school committee meetings, town finance committee meetings, faculty meetings, and by meeting with the students. School district websites and blogs were also used to share the plan and their goals, such as making technology ubiquitous in order to increase student engagement and personalizing the learning experience.

This kind of motivational framing was evidenced in several ways. For example, when Brody communicated with stakeholders, he indicated that he wanted “the students to have the ownership of the learning, so that it’s more meaningful to them.” Jackson, the Monroe superintendent, communicated that he did not want computers to simply substitute for pencil and paper. When he viewed the classroom use of technology he
wanted to know: “Is this really engaging kids more? Is this really pushing them so they’re doing more higher order thinking around it?” The cost of the large-scale technology initiatives brought more scrutiny from stakeholders in the community. Superintendents and technology leadership team members worked to reframe the argument. A good example of this was when Norman, the superintendent from Adams, wanted to get stakeholders to stop thinking of technology for education as a luxury, but rather as an expense that is as necessary as textbooks or electricity:

We basically turned the conversation around and said “technology infrastructure is our fourth utility.” I went through the whole spiel about textbooks and electricity. We pay $1 million a year in electricity and no one bats an eye. Not the cost of it, no one at a town meeting cares, it’s just expected that we’ll have electricity in our buildings.

Norman also made the case that having 1:1 iPads was not a new idea: “We had 1:1 for fifty years…our 1:1 was previously textbooks.” The ability to make an effective argument for the large-scale technology initiative was important for the superintendent’s motivational framing activity. Brett from Madison discussed how he used a similar analogy when discussing the initiative with stakeholders:

[If I said] “take me to your pencil lab.” “Pencil lab? What’s a pencil lab? It’s ridiculous.” Well, we look at technology the same way. You don’t always need the pencil and you don’t always need the laptop, but when it’s there situationally, you need it.
Communicating goals and arguments such as these, in the multiple forums that were used by superintendents and their team, were leadership actions that were consistent with motivational framing (See Figure 3).

**Diagnostic Framing**

As described in Chapter 2, diagnostic framing focuses on the identification of a problem and assigning blame connected to some injustice (Benford & Snow, 2000). Therefore, we analyzed the data to discover any superintendent actions that were consistent with diagnostic framing.

We found that Bob, the Madison superintendent, was the only superintendent that considered diagnostic framing in his attempt to gain acceptance for the large-scale technology initiative. Bob described the lower socioeconomic status of families in his district as a motivator for their large-scale technology initiative. Bob’s students lacked internet-connected computers and he saw their initiative as being able to close this digital divide. The other four superintendents did not connect their large-scale technology initiatives to any injustice or see the need to assign any blame to justify the initiative.
Figure 3. Strategic processes are a function of prognostic and motivational framing and they work to counter constraints. If successful, this leads to resonance. Adapted from, “Framing Processes and Social Movements: An Overview and Assessment,” by R. D. Benford and D. A. Snow, 2000, *Annual Review of Sociology*, 611-639.

**Superintendents Considered Constraints**

When the superintendents planned for implementation of the large-scale technology initiative, nearly all assessed their educational community and considered constraints that might hinder acceptance of the initiative. Consistent with prognostic framing, all superintendents developed solutions to problems via goals and a structured plan for achieving those goals (Bedford & Snow, 2000). The problems were not static, however, and the superintendent’s structured plan was constantly contested and influenced by various constraints. These constraints were often of a financial or political nature. An important early action taken by superintendents was the manner in which they responded to constraints surrounding the large-scale technology initiative. We found that
superintendents considered the following constraints: (a) financial, (b) political, (c) competing interests, and (d) technology support staffing.

**Financial Constraint**

Financial constraints were considered most often (by all superintendents and nearly all technology leadership team members) in planning their initiatives. When districts are proposing large-scale technology initiatives there is usually a correspondingly large price tag that goes with it. A financial constraint may mean that the best decisions regarding the technology initiative might not be possible. If the cost of a 1:1 initiative is determined to be too large, districts will look for other options, such as BYOD. Accordingly, we analyzed data to see what financial constraints superintendents faced and how those constraints may have influenced their decision-making regarding the initiative.

As an example, the Washington School District looked at what a district-provided 1:1 initiative would cost and decided to pursue a BYOD initiative because of their financial constraint. As Brody noted, “We made the conscious choice that there was no way we could do a 1:1 from a financial standpoint, it wasn’t a sustainable solution.” Other technology leadership team members echoed the sentiments of the superintendent. Georgia, a technology integration specialist, stated, “We made it perfectly clear why we’re doing this, number one being financial.” Even though implementing a BYOD program is less costly than a district-provided 1:1 initiative, there are still costs associated with building a robust wireless network that can handle all of the devices. John, the network manager, described the financial constraints they faced building the network: “Because the wireless was so expensive, we literally took four to five years to get that to
where we wanted it at all the schools.” Districts that decide to provide devices to all students face expenses far beyond the cost of building a wireless network.

How much a particular technology device costs is a decision that affects a district’s 1:1 budget. The two districts that decided to purchase iPads for their students did so partially due to financial constraints. David, the superintendent of Jefferson indicated: “We looked at laptops…that was very tempting, but financially we couldn’t afford that so we never really got beyond that point to be honest.” Jim from Adams described their thinking this way:

Would we have done a different device if we could have spent a lot more money? It’s possible. We always talked about a MacBook-type laptop for all students, but that would have been a lot more expensive. Could we have said, “Maybe we’ll do that?” Maybe, if we had more money, but ultimately, we wanted the iPad device.

These districts were referring to the cost of Apple laptop computers, which began at $999 (all prices in 2013 dollars), because there were PC based laptops that were comparable to the cost of an iPad ($499). Chromebooks were a more recent laptop product that were even less than the cost of an iPad, but for reasons that will be discussed later these districts had decided they were going to purchase an Apple product. The superintendent from Madison, Bob, described their ability to keep adding new technology and the decision to go with Apple products this way:

You can buy two iPads for the price of a MacBook Pro. We have [also] looked at the total cost of ownership, because you can buy a Dell [laptop] for around $400 compared to $1200 or $1000 for a MacBook Pro, but by the time we add the
software, the infrastructure, the support, and the rest, I think they’re not that far off.

As Bob stated, other costs were considered in addition to the cost of the device. The costs varied by district but included the following: mobile device management software, protective cases, software and apps, extended warranties, and insurance. Some of these costs were passed on to the students. For example, Adams, Jefferson, and Monroe school districts provided devices to students, but informed them that if they wanted to insure the device it would be at their own expense.

Jackson, the Monroe superintendent, had a large financial constraint removed when the town financial committee decided to increase the school operating budget in order to pay for technology purchases. The Monroe district was able to purchase Apple MacBook Air computers for all high school students. Previously, the school district would make capital spending requests of the financial committee for technology infrastructure. Jackson stated that when this change was made,

There was this influx of funds, that we could all at once put towards a lease, which in a different year might have gone towards actually paying for [network] infrastructure. [This] is mostly what the capital money was for, but we were in good shape in that regard. We didn't need to do that…we were able to apply [the money] to this lease. Once it's in your operating budget it's there, where you don't have to ask for it every year. So that stabilized us enough to have [the funds] to pay for the lease of the computers.

Making cuts to other areas of the school budget was another way to overcome financial constraints. In the Adams School District the community placed great value on not
having fees that parents would have to pay related to school. Jim indicated the importance of this financial constraint:

The biggest thing that was considered is that we’re a district that doesn’t have fees. So we knew right away that we were not going to fund our technology initiative with a technology fee. That was kind of off the table from the very beginning, which made it more of a challenge for us right from the very beginning --we knew that we had to fund this thing entirely.

In order to partially fund their iPad initiative, the Adams School District reallocated money that was budgeted for new textbooks, decided not to fund a new foreign language lab, cut the positions of one teacher aide and a permanent sub, and reallocated funds that were earmarked for printing costs. Paul, the former high school principal, justified the cutting of the foreign language lab by claiming that due to the 1:1 iPad initiative, “we’re going to have a language lab in every classroom.” When a district faces financial constraints that no amount of cutting or reallocating of funds would allow for a district-provided device 1:1 model to take place, one option is to have the parents pay for the device.

The Madison School District came to this conclusion and developed a blended model to get their students access to more technology. Madison decided to overcome their financial constraints by creating a non-profit company that was managed by the superintendent and some of his staff. They developed a lease-to-own model where the non-profit purchased MacBooks and iPads from Apple and then leased them to parents who make monthly payments on the device until it is paid off. Bob estimated that roughly 30-40% of students in grades 7-12 were participating in the lease program.
Students that received free or reduced lunch were able to pay a reduced cost for the lease. Madison supplied carts of iPads and MacBooks in the schools for students that did not participate in the lease program. The district also permitted students to bring their own device in and use the school network. This blended model was not a true 1:1, but as Brett described it:

We were very entrepreneurial. I would say that differentiated us from a lot of the other programs that I still see today. We did not have much money and so we always had to be entrepreneurial, especially when you have parents investing in your program, you have to be providing value.

Every superintendent faced financial constraints of varying degrees and they made decisions based on those constraints. In addition to financial constraints, nearly all districts faced political constraints that the superintendent had to consider.

**Political Constraint**

When implementing large-scale technology initiatives support may need to be gained from multiple stakeholders. These stakeholders could include school committee, town financial committee, parents, teachers, and the community. For this study, the lack of support (perceived or actual) from any stakeholder was defined as a political constraint. Nearly all school districts in this study described political constraints surrounding their large-scale technology initiative.

The Jefferson district was in the midst of building a new high school. The town had already approved a tax increase to finance the new building project and technology leadership team members did not feel they could ask the community to pay any additional
money for the 1:1 iPad initiative they were considering. Grace, the former high school assistant principal, described the perceived political constraint this way:

The biggest thing was whether or not we could pull it off within the building funds, because politically there was no way we could’ve done it otherwise. If we had to go to parent funding, that would have never flied in this town with all the money people were putting towards a new building.

David, the superintendent, agreed with this sentiment when he was asked if he ever considered asking parents to contribute money to help pay for the iPads:

It was definitely talked about…[but] Jefferson has historically prided itself on not having fees. We do not have an activity or athletic fee. The only fee we have is a bus fee and a parking fee, that’s it, and even those don’t go over too well.

Politically, that would have been a tough one. I couldn’t have done it.

The concern over the high cost associated with large-scale technology initiatives was pervasive among the five districts, but districts also faced other types of political constraints.

The Monroe School District faced a greater challenge convincing parents and the community of the merit of the 1:1 laptop initiative than it did funding it. Tim, the former high school principal, described the political constraint the initiative initially faced from teachers:

We needed teacher buy-in first and foremost, and that was successfully achieved by it being a teacher-lead initiative; by going to other schools [to check out their 1:1 programs], getting a feel and talking to other teachers about what impact it has...
on their instruction, but there were some who thought, “I'm teaching Math, I don't really need this...” [so] there was that element there.

The Madison School District also faced a political constraint from some of their teachers. As Brett recounted: “We tried to start with the high school teachers. We pitched the idea to them and they said, ‘No way. Ain’t going to happen’.” Due to this opposition from the high school teachers, Madison decided to implement their technology initiative in grades five and six, where the teachers were more open to the initiative.

Overcoming a political constraint from the community was another challenge in the Monroe School District. According to Tim,

With the lease program, it's something like $230k per year. The community had to be convinced this was a good thing for our school and a good thing for the community as a whole. That was tough in some ways, and not so tough in others. There are people who would say: “This is a 'well to do' community. The median cost of a home is around $600 thousand...why are we using school funds to buy computers for kids when people can buy them on their own?” There were other families who frankly had been shielding their kids from technology. “My kid doesn't have a phone, we have one computer in the house and it's in the kitchen so we can monitor it. You’re going to give them this tool and now my parenting is going to be a lot harder.” They needed to be convinced. [At the same time] it was easier because there were a lot of technology folks in town, so at these community meetings those parents would pipe up and say “This is the direction of the future, we need to get our kids ready, this is what college- and career-ready is.” There was a nice balance, but the community needed to be convinced.
The Adams School District faced a similar political constraint from their community and school committee. Howard stated:

“We had numerous fights from town meeting members and so forth, thinking it was a waste of money. The more and more education that we provided to them, the more and more buy-in we got. The first year was a little bit rough to get that approval. After that we've done numerous presentations with students and teachers, for school committee, for Ways and Mean Committee, town meeting members. We've invited all of those committees and regular town residents to visit our schools…and let them do walk-throughs of our buildings to actually see the devices in action.

In addition to financial and political constraints, superintendents that implemented large-scale technology initiatives also considered time and competing interest constraints.

**Competing Interests Constraint**

At the same time that the districts were trying to implement their large-scale technology initiative, the attention of teachers and administrators needed to be spent on other initiatives. These competing interests were locally, as well as state, driven. Nearly all superintendents considered time and competing interest constraints and technology leadership team members in all of the districts identified them as well. As Tim, the former principal from Monroe High School, indicated, competing interests can impact the implementation of a large-scale technology initiative:

If I were to give advice to any other school around initiating a 1:1 project, I would make sure that's the only thing you're doing that year. Not only did we start 1:1, we also started an advisory program. This was the intersection of things we were
talking about and planning for a long time and they just happened to come together in the same year. Then we had the introduction of the new evaluation system that we had to train on last year. So you had three really big things happening. Then we [also] had looming a [regional accrediting association] visit. So there was a lot going on and I think that had a little bit of an impact on the 1:1, or a lot [of an impact].

Jackson, the superintendent of the Monroe School District, expressed his concern over the “deluge of initiatives, most of which are fairly good, but collectively are overwhelming.” Some of these competing interests that Monroe and the other school districts identified were: the state’s new educator evaluation process, the state requirement to identify assessments that will be used to measure the impact teachers have on student learning, the state English language learner requirements, state program reviews, and updating curriculum frameworks, partially due to the adoption of the Common Core State Standards (CCSS). Ethan, a former middle school principal from Washington, expressed a sentiment heard in nearly all districts: “It's definitely had a huge impact on staff. Many of them realize it will lead to a positive place…but it's still a lot on their plates.” In most cases, the appreciation for the strain that these competing initiatives placed on teachers resulted in little more than a sympathetic attitude from technology leadership team members.

When Jackson considered this competing interest constraint and the demands it placed on his educators, he saw his role as “helping teachers and principals to focus their time, energy and resources.” Norman, the superintendent of Adams, decided to limit the

---

7 CCSS = Common Core State Standards, a new national curriculum implementation as part of Race to the Top.
amount of time he had teachers working on the competing interests because, “First, we’d bore the hell out of people, and second, it's not necessarily what we value.” Norman decided to prioritize professional development time around transforming the classroom through technology integration and improving student engagement, and use only what time was necessary to train the faculty on state initiatives such as the new teacher evaluation system. Charles, the high school principal from the Jefferson School District, recognized the pressure the teachers were under and wanted to make sure that teachers were not presented with any more new initiatives in the second year of the 1:1 iPad initiative: “Curriculum, [regional accrediting association], 1:1, co-teaching, level changes, brand new building – you name it, there was a lot going on. That wears on people and on the faculty, and I fully get it.” All superintendents recognized the strain that competing interests placed on the implementation of the technology initiative, but most superintendents did not have a remedy for this constraint. The last constraint that superintendents considered was with regards to their technology staff.

**Staffing Constraint**

Nearly all superintendents identified the capacity of their existing technology staff to support the large-scale technology initiative as a constraint. Superintendents recognized that the addition of large numbers of mobile devices accessing the school network in their buildings would place demands on their technology staff. Even in a BYOD environment such as in the Washington School District, the superintendent had concerns about the capacity of his technology staff. Brody noted that there would be greater demands on his technology staff, “at the start of the year when students bring in devices, but also to make sure the network is maintained. We had to be sure we had the
staffing, so we put in the budget to have additional staffing.” To try and avoid adding
additional staff (technology staff were eventually hired), Norman, the Adams
superintendent, was attracted to the iPad because the students could individually manage
the devices.

Another way nearly all superintendents addressed the staffing constraint was by
utilizing the technology skills of their students. Student help desks were created in the
Adams, Jefferson, Madison, and Monroe school districts. As Grace from Jefferson stated,
“We used our own kids to expand our tech capacity because we didn’t have it.” Brett
from Madison recounted a student help desk story he witnessed:

I'll never forget the day I walked in and there was a seventh grader on the phone
with Apple Care saying: "Listen guy, I ran triage on it, I replaced the battery, it
can't be fixed here, send me a box, it's coming back." It was a seventh grader. It
was just brilliant. It was just absolutely brilliant.

Grady from Washington made it clear that there were really two types of technology staff
that districts needed to consider. He indicated that Washington had technology staff that
worked on the network and infrastructure side and then they had technology integration
specialists that worked closely with teachers to help them understand how to use the
technology and how they could develop lessons around the technology. While
recognizing the important work that both types of technology staff were responsible for,
Grady said, “Do we have enough? The answer is no…on both sides we could use
support.” Our third finding related to the actions superintendents took to gain acceptance
for the large-scale technology initiative and is discussed in the next section.
Superintendents Developed Strategic Processes

As stated in Chapter 2, strategic processes are components of frame theory. Strategic processes are specific actions regarding the initiative to gain acceptance within the district. Our second finding was that there were several strategic processes that superintendents developed to gain acceptance for large-scale technology initiatives. These processes were developed in two ways. First, they helped to prepare for implementation. Second, they helped to create buy-in.

Preparing for Implementation

All or nearly all superintendents utilized the strategic processes listed below to prepare for the implementation of the large-scale technology initiative. These were large initiatives that commanded significant financial resources; the number of actions taken by superintendents indicated their understanding of the complexity of the initiative. The order of the strategic processes described below was chosen for reasons of style and it is not our intent to imply a particular order was used by the superintendents.

Conduct research and select equipment. The term “research” is used to describe the investigative practice of learning from other 1:1 or BYOD school districts, reading relevant articles, and learning from product specialists or sales representatives from technology infrastructure companies. Conducting research and selecting equipment were very much tied together. District leadership conducted investigations into what type of equipment should be selected. All of the superintendents described researching other school districts with 1:1 initiatives in varying degrees of implementation. Varying by district, superintendents and technology leadership team members visited 1:1 schools in Iowa, Maine, and Massachusetts to learn from their experiences. Jackson, the Monroe
superintendent, decided to forego a BYOD model based partially on what he saw at a 1:1 school in Maine:

I really saw when I went up to Maine how seamless the whole thing is, when everybody has the same [device]…the teacher didn't have to waste any time at all in terms of spending precious minutes [orienting the] kids in the beginning of the class for instance.

Brody from Washington stated they “did a lot of research in what successful BYOD programs were, what were the challenges and obstacles, so that we could try to eliminate as many of those as possible.” Grady from Washington concurred with the superintendent:

There was a significant amount of time, effort, and research put into what could be a good fit for our community. District leaders went to presentations on 1:1, to other schools, and talked to administrators and other people in our roles to ask, “How did you do it? What were your challenges? What worked well for you?”

We tried to match our challenges to theirs.

After conducting research, David, the superintendent of the Jefferson School District, decided that he was going to make it a priority to build a robust wireless network: “That was one thing that I heard loud and clear from superintendents. Do not skimp on the infrastructure…don’t build it for 3,000 devices, build it for 20,000 devices.”

Some of the research conducted by Tim from Monroe shaped his opinion on what type of device to purchase: “For me, it was wanting a quality machine – we've heard disaster stories when people have bought certain other things, netbooks – we [also]
wanted to make sure it was PARCC-ready.” Meagan, the director of technology from Monroe, recalled that they “chose the MacBook Air because of the solid-state drive, we thought that would be more durable, less moving parts.” Charles from Jefferson indicated that from “conversations and visiting other places, we felt the iPad was more user-friendly. The flexibility and the apps you could use.” Norman, the superintendent of the Adams School District, had concerns about the workload his existing technology staff could handle and felt that managing iPads would create less demands on their time than other devices would. “I wanted them [the devices] individually managed. Long battery life because we have an older school without a lot of outlets. We thought with a laptop we’d get three to four hours out of them and then have problems.” The Adams Technology Plan further stated why they selected the iPad as their 1:1 device:

After extensive research, discussion, and community input, Adams High School believes that the iPad currently provides students and teachers with the best option for creating a 1:1 school. The iPads will be a source of student engagement and instruction with the use of applications, web-based software, and eBooks.

In addition to conducting research and selecting equipment, identifying key players that would help lead the large-scale technology initiative and help gain acceptance for it, was another strategic process that all superintendents carried out.

**Identify key players.** Each superintendent identified district technology leadership team members that played important roles in the planning and implementation of the large-scale technology initiative. These individuals would be considered key

---

8 PARCC = Partnership for Assessment of Readiness for College and Careers – includes online assessments to measure student progress with regards to the Common Core State Standards; not a required assessment at the time of this study.
players, but nearly all superintendents identified certain teachers, students, and parents that were also key players in the implementation of the initiative. The superintendent of Washington, Brody, acknowledged the importance of the key players in his district: “Getting the principals on board was critical, [but] the tech integration specialists were the ones that were going to help support these teachers…they would go into these pilot classrooms, and work with the teachers.” Additionally, Tim, the former high school principal from Monroe, described the important role some of the teachers played:

It was always framed as a teacher initiative. There were enough teachers on campus who were interested in and committed to increasing the amount of technology for themselves and students that I didn't really have to push all that hard. It was a matter of getting the group together and having them be the mouthpiece for the direction the school was headed.

Key players were asked to promote the initiative to the community, school board, or the town finance committee. Jackson, the Monroe superintendent, used some of his key players in this way. Tim indicated the importance of the teachers, student and parents:

There were a handful of teachers who were just phenomenal. We had faculty meetings, and with something this big, my voice better not have been the loudest...[it was important to have] a representative body [of teachers] saying “this is going to work for us”. We had students who were also involved and presented at the community meeting, so their voices were a part of it. We had parents as well. When we went to [another 1:1 school] to visit, there were parents that came, and at least one of them wasn't on board [with the 1:1 laptop initiative].
It was good [to have the parent that did not support the initiative come, because] at least [the parent could now make a more] informed decision.

The Washington School District had a group of “lead teachers” that would meet monthly with the technology integration specialists to help move the BYOD initiative forward. According to Ava: “we would all share apps we were using, things that were successes, things that weren't going so well, ways to improve, ways to expand, how to get more teachers and students on board, etc.” The Adams School District created a 1:1 parent committee that had a similar goal. Jim, the technology integration specialist, described how the committee would talk about matters such as what types of protective cases were best and iPad insurance options. Jim also indicated that they “involved the parents and community members in the conversation from the very beginning.” Key players were often involved in piloting new technology as well.

**Pilot devices.** Piloting is defined as schools conducting classroom trials of mobile devices. Piloting was typically conducted for the following reasons: testing devices to see if they should purchase more of them, identify potential technical problems, give teachers experience creating and conducting lessons that integrate the technology, and to create momentum for the initiative among students and teachers. Each superintendent piloted mobile devices as a strategic process in their effort to gain acceptance for the large-scale technology initiative. Rylan, a technology integration specialist from Washington, described how they used their key players for piloting:

The idea is if you put technology in the hands of the right people, it's just going to spread and grow. They targeted willing people, a few teachers, years ago. They were given room to play. There was no breathing down their backs; they could
take it at their own pace to incorporate it into their curriculum and classroom. I've seen that spread throughout teams, spread through the same grade level, and then different grade levels. It's almost like a virus that's gone around.

All districts piloted various devices to test them before making a final purchase for the 1:1 initiative. The Adams district initially bought a couple of mobile iPad carts that teachers could sign-out for classroom use. The iPads were used constantly and the success of the pilot helped them decide on the iPad for their 1:1 initiative. Before the Monroe School District chose MacBook Airs as their device they piloted PC laptop carts and netbooks. Chromebooks were one of the options investigated because of their lower cost. Rose from Madison described their experience piloting Chromebooks:

We piloted the Chromebooks in one room specifically just to monitor how often they need to be fixed, how often there are issues, and that teacher has been like, “Please... just take them away...” Even though they're cheaper and we could've put more of them in place rather than an Apple product, we had way more issues with them than with Macs.

In contrast, while the Adams School District was 1:1 with the iPad they were still piloting new technologies such as the Chromebook and had a more positive experience than Madison indicated. The superintendent, Norman, stated that each school in the district had at least one classroom set and they were seeing their use “grow in popularity.” When districts were introducing new technology, whether it was through piloting or a full-scale implementation, all superintendents recognized the importance of professional development for the teachers that were expected to use the technology in the classroom.
**Conduct professional development.** The superintendents in each of the five study districts supported professional development in the use of classroom technology. The professional development occurred before the large-scale technology initiative began and has continued after implementation. The value that the districts placed on professional development was evident in the interviews we conducted as well as in the documents we reviewed. The technology plan for the Adams School District states:

All Adams Public Schools teachers will receive extensive training and ongoing support to help them learn about technology and prepare students for life in a digital world. Technology professional development is administered throughout the school year and is led by both Instructional Technology staff and academic area teachers. Adams Public Schools is very proud of the staff in Adams and its commitment to technology in our schools. We are also very excited by the growing number of teachers leading professional development sessions for their peers.

Other districts had similar statements in their technology plans. All districts had limits on the amount of contractual time that was available for professional development. To overcome these contractual limitations, as well as the reality that time must be saved for professional development around competing interests, each district offered their educators optional or voluntary technology professional development that was held outside of contractual time. The most striking example of this was in the Washington School District where the superintendent taught a course on improving teaching and learning. Encouraging teachers to integrate technology into their lessons was a major focus of the course. Teachers signed up for the class and could earn six graduate credits.
that were available through a local university. Teachers who successfully completed the course were provided with classroom technologies such as iPads or laptops as an incentive. Brett from the Madison School District did something similar. Brett became an adjunct professor for a local university; teachers could take his course in educational technology for credit. At Adams the technology staff made themselves available several times a month for technology professional development sessions that were titled, “How do I do that?” or, “Open Support”. Howard indicated that they would have “anywhere from three teachers to fifty teachers” in attendance at these voluntary sessions. The Jefferson School District offered “Technology Thursdays” and “Wednesday Walkthroughs” as optional professional development for their teachers. The Thursday sessions had an open agenda, and the Wednesday sessions were for teachers to observe how their colleagues were integrating technology into the classroom.

All superintendents offered professional development related to their large-scale technology initiative during contractual times as well. Professional development began in Jefferson six months before the students were given devices and two years before in Monroe. Grace from Jefferson described the initial training they offered their teachers:

We had a couple days' training by Apple, and we broke it up so you had advanced users, intermediate, and beginners. Everyone got the self-selected level of training they needed. Those in the advanced group, many were vanguard teachers [key players], and many took the lead in offering trainings to other teachers.

As reported above, in addition to hiring outside trainers, nearly all districts used their own staff to train their colleagues. The largest example of this is the Adams School District three-day edcamp that is held before classes begin each September. According to the
superintendent, Norman, “There will be sessions certain individuals have to go to, but there’s always choice.” Over the three-day span approximately one hundred sessions are offered and nearly seventy percent are related to technology. Whether the technology professional development is during contractual time or optional, the superintendent action of making professional development opportunities available to teachers is a strategic process geared towards gaining acceptance for the large-scale technology initiative.

**Assess the capacity of the technology staff.** An additional strategic process that superintendents took to prepare for the implementation of the initiative was to assess the capacity of the technology staff. The capacity of the technology staff was defined as the ability of the technology staff to fulfill any additional responsibilities that would come if a large-scale technology initiative were implemented. This was considered a strategic process when the superintendent used the results of the assessment to add technology staff if needed to ensure that teachers and students would be properly supported for the large-scale technology initiative. As a result of this assessment, the Washington, Jefferson, and Monroe districts added at least one person to assist with the technology initiative; Adams and Madison added technology staff in their second year of the initiative. Norman, the Adams superintendent, tried to avoid hiring additional technology staff because of the cost:

In the old world, you added about 10% on for every person you [hired] for health and benefits, but we're up to about 40% now. I get less grief adding iPads than I did adding like, a custodian, because they know that's a sustained cost over time and [they] know that health care is going to kill us.
Despite this desire, Norman hired an additional technology staff person to support the initiative in the second year. Jim described the staffing issue:

Well, there were only two members of the IT staff at the time we first started; now there are three. We were concerned. We talked a lot about the fact of putting 1100 new devices in one school; how would we ever be able to support that? Realistically, two people -- it wasn’t going to be enough.

As part of this assessment of the capacity of their technology staff, four of the five districts added a student help desk, also known as a Genius Bar, in order to utilize the knowledge and skills of their students to help with technical support issues for students and teachers. According to Tim from Monroe, they created their student-run Genius Bar “to cover the issues kids might encounter, like not being able to print, or creating presentations. The kids were trained and in the process of becoming Apple certified.”

The Jefferson School District created a student help desk, but as Charles described, they also added an additional technology support person:

The big piece was we wanted to make sure we had enough staff to help out – and we're still looking to add more staff, especially as we become a bigger building. They definitely had a role in it. The staffing is a big piece. You can have all the technology you want, but you need those people. We learned that from [another 1:1 school we visited]. Their tech people were there all the time and they communicated very well.

In addition to strategic processes to prepare for implementation of the initiative, superintendents made efforts to create buy-in for the initiative from the various stakeholders.
Create Buy-In

Not surprisingly, superintendents would like to see any new initiative they support to be successful. Creating buy-in amongst the stakeholders is one way to help achieve that success. The superintendents in our study identified that the main stakeholders they wanted to create buy-in with were the teachers, principals, school committee, parents, community, and the students. Of these multiple stakeholders, teachers were the main focus of the effort to create buy-in. The two strategic processes that superintendents took to create buy-in were communicating expectations for use (for teachers and students) and public relations efforts.

Expectations for use. All superintendents communicated their expectations for how the technology would be integrated in the classroom. This was communicated through speech and documents at school committee meetings, public forums, to teachers, to students, and through modeling. The expectations for use that was communicated varied somewhat between the school districts. Nearly all superintendents indicated they saw technology’s role in the classroom as a tool, like many others available to teachers, on an “as needed” basis and not a mandatory one. These comments from Norman were representative of the group:

We have some teachers here who think technology is the bane of existence and they had kids in inkwells and calligraphy is a lost art – but they're still here and we’ve got to work with them. We say it all the time – a [bad] lesson with an iPad is a [bad] lesson. Again, [we] focus on engaging high-quality instruction, [it] has nothing to do with the device. You can lecture - as long as it's engaging, that's
great. We look for engagement and we prioritize engagement. Technology is one vehicle towards that, but may not be all the time.

Nearly all superintendents’ and technology leadership team members’ communication to teachers contained a message of patience. Teachers did not need to be experts in the technology right away, but hopefully that would not restrain them from attempts at incorporating the new technology in their lesson plans. Risk-taking by teachers was encouraged. Grace from Jefferson described how she communicated her expectations for use: “I went over the SAMR Model [with the faculty]...I said it’s okay to be at any one of these levels when you start, but the goal is to take risks, because we want you to move up the model.” The superintendent from Monroe, Jackson, had a very similar message: “we’re not fully there, [but my expectation is for teachers to use the technology in] transformative [ways], as opposed to just substituting [for] paper or the textbook…If that’s all there was, I don’t know we'd want to put this huge investment into it.” The message of taking risks was repeated by Jim from Adams: “No one says you have to use technology all day long, but there's a very consistent message from the leadership that you should be trying to integrate something new, so that is a message that they hear quite often.” The Washington School District had the most relaxed expectation for use. Washington is a BYOD model and as Ava described it: “Teachers are still given the option if they want these devices in their classrooms. Some embrace them, some are really nervous about them.”

While the overall message from superintendents was partly one of patience, nearly all superintendents modeled the use of technology to encourage use among their teachers.

---

9 SAMR = Substitution, Augmentation, Modification, Redefinition. Indicates the level of technology integration from low to high (Puente\-dura, 2013).
staff. The Washington superintendent taught the college course on integrating technology, the Adams superintendent blogged regularly, and the Madison superintendent was a frequent user of Google Apps. Bob stated his belief in leadership by example and said, “I often model what I want to see the principals or administrators model [for their staff]. Oftentimes I have assignments for them that require them to actually go online or use technology to get things done.” The message from superintendents of setting reasonable expectations for use, encouraging risk-taking, and personally modeling the use of technology was a strategic process used by superintendents to help achieve buy-in. In addition to communication expectations for use, public relations efforts by the superintendent were another strategic process used by superintendents to achieve buy-in.

**Public relations.** We defined public relations efforts as the actions the superintendent took (or supported) for the purpose of creating buy-in with people, often stakeholders outside of the school system and with those that have authority over the superintendent. These actions were designed to persuade people to support the large-scale technology initiative and to coordinate the message that was communicated to the public with regards to the initiative.

All superintendents engaged in public relations efforts. The most common action in all districts was to hold public informational meetings about the initiative. Howard, the director of technology from Adams, described how the district achieved some buy-in after holding multiple meetings:

The more and more education that we provided to them, the more and more buy-in we got. The first year was a little bit rough to get that approval. After that
we've done numerous presentations with students and teachers, for school committee, for Ways and Means, [and for] town meeting members. We've invited all of those committees and regular town residents to visit our schools. Not at any time of course, but as groups, and let them do walk-throughs of our buildings to actually see the devices in action.

Superintendents and technology leadership team members gave presentations on the initiative to one or more of the following groups: school committee, parent teacher organization, and town finance committee. Data was not collected to show if any group was more targeted than others. According to Grady from Washington, their meetings helped put parents at ease: “The community needed reassurance to know that within this particular BYOD initiative that if a child didn't have one of the many supported devices, we could provide [one for them].” Norman, the superintendent of Adams, tailored his sales pitch for the initiative based on his audience:

I said it's actually going to be more cost-effective if we do this a bit over time, and sustain a modern infrastructure so I don't come to you every ten years and say “I need another $10 million”. If they're bean counters, you make a bean counter argument. If they're inspirational leaders, you make the inspirational argument. But if you go in and try to make an inspirational instructional argument to people who are seventy and on fixed pensions, you're barking up the wrong tree.

Superintendents worked to get their message out to the public in other ways as well.

Superintendents promoted their websites as sources of information about their large-scale technology initiative. Jackson from the Monroe School District indicated that they have a website dedicated to the initiative: “It’s got the research. It’s got the goals.
It’s got easy access for the public.” All superintendents also indicated they used one or more of the following mediums to get their message about the initiative out to the public: email blasts, Twitter, Facebook, blogs, and electronic newsletters. Norman from Adams indicated that the press doesn’t cover public meetings as much as they use to, but that people were still looking for local news. He saw that blogging was critical to filling this void and it helped to get an accurate and consistent message out to the public. Norman stated, “A lot of newspapers now are pulling stories directly off my blog, [the assistant superintendent’s] blog, [and] our principal's blog; I think that's part of the job responsibility that didn't exist before.” The Monroe School District took a different approach to educate their school committee about the initiative and to try and create buy-in. They created a course on 1:1 initiatives and had the school committee members complete the course on the district’s learning management system. Superintendents took a variety of actions to create buy-in for the large-scale technology initiative.

**Conclusion**

The overall study resulted in three central findings as to what superintendents do to gain acceptance for large-scale technology initiatives: (a) superintendents achieved resonance through leadership actions that were consistent with prognostic and motivational framing, (b) superintendents considered constraints the initiative might face, and (c) superintendents developed strategic processes to gain acceptance for the initiative. These three findings, as well as the findings from the five individual studies (see Table 1), will be discussed in Chapter 6. The individual studies will be submitted for each author as Chapter 5.
Chapter Five

Framing Innovation: Do Professional Learning Communities Influence Acceptance of Large-scale Technology Initiatives? 10

Problem

The purpose of this overall study was to examine how superintendents seek to gain acceptance for large-scale technology initiatives; Chapters 1-3 explained use of Frame theory to examine superintendent and leadership team framing actions as they sought to gain acceptance for these initiatives in their school districts. Acceptance, as defined for the study, is described as a district placing technology devices in the hands of students in a 1:1 fashion for some regular and reliable portion of their instructional program.

Another way to explore how superintendents gain acceptance for large-scale technology programs in their systems is to determine whether and how superintendents use expectations around educator collaboration to aid the implementation.

Superintendent actions can be explored through examination of how they handle collaboration in their school systems when implementing large-scale technology initiatives. Professional learning communities (PLCs) is one popular way that districts incorporate and describe educator collaboration in school systems. It is important to note that while numerous schools and systems may use the term “professional learning communities” to describe how their teachers work together to better student achievement, it has been identified in prior research (Talbert, 2009) that many systems do not actually employ professional learning communities, rather, they use the label of “PLC” to

10 Author: Anna P. Nolin
101
describe the fact that their educators share time and work in a collaborative manner, without discussing other critical constructs present in a PLC. Because of this tendency, “collaboration” for my study will be described and explored using the PLC label and constructs as defined and popularized for schools by Dufour, Dufour, Eaker, & Many (2010). These constructs most closely align with what educators mean when they talk about collaboration and professional learning in their school systems.

Formal PLC implementation commonly described in public school implementation is defined by the following constructs: groups of collaborative educator teams who share collaborative time, a focus on continuous improvement with an action/experimentation orientation, and a “results-oriented” emphasis on improving student achievement (Dufour, Dufour, Eaker & Many, 2010; Eaker, Dufour & Burnette, 2002; Hord, 1997; Talbert & McLaughlin, 1994, 2001, 2002). In the United States, much has been invested in PLCs. In 1996, the National Association of Secondary School principals (NASSP, 1996) cited PLCs as the heart of their blueprint for high school reform. The NASSP renewed the PLC focus of this text in 2009.

Among small-to medium sized school systems, a random sampling of 30 school improvement plans posted on the district websites revealed that 100% of these documents mention PLCs or some variation of PLCs at play in their school reform work (Appendix G). It is clear that PLCs or PLC ideas and jargon have a strong presence in school systems in this state. However, this study seeks only to evaluate the relationship between PLC constructs and large-scale technology implementation, not the extent of true PLC

---

11 With 487 districts in the study state, over half (175) are very small and 88% are 5,000 students or fewer, (State Organization of Educational Collaboratives, 2009). The random review of the 88% yielded all sites indicating PLC implementation or use in some fashion in their published goal literature.
implementation. School systems in this state most frequently characterize collaboration using PLC constructs. Professional learning communities are cited in school and district improvement plans as a mechanism used to operationalize school reform initiatives and mandates. Therefore, this study will refer to PLCs and the definitions noted in Table 6 as the “collaborative constructs” through which student achievement needs and school reform and innovation agendas are executed. The PLC constructs will be interchangeably referred to as both “PLC constructs” and “collaborative constructs” throughout my study.

School and district leaders, who have the power to support collaboration and explore effective avenues for reform, often look to PLCs to serve collaboration, professional development, change, and innovation (Seels, Campbell & Talsma, 2003; Soliman 2000; Whitford & Wood, 2010; Williams, 2008; Yang & Huang, 2003). However, professional learning community advocates offer little on technology implementation with PLC advocates Rebecca and Rick Dufour at best, noting, “although technological innovation does not have the power to transform traditional school cultures into PLCs, technology can support educators determined to make that transformation,” (Dufour & Dufour, 2010, p. 553).

Despite the focus on PLCs as mechanisms to aid school reform work, it is unclear if districts know whether and how to leverage existing PLCs as a district collaboration structure to support educators transacting new technology expectations and reforms. There is little research that assesses PLCs as a means to assist in integrating technology use into educator practice and student experience. Building level studies on technology-integrated learning or innovative learning environments advocate the creation of a sort of new “learning ecology” around the implementation and use of technology (Corn,
Osborne, Halstead, Oliver, Tingen, & Stanhope, 2009; Spires, Oliver & Corn, 2011; Zhao & Frank, 2003). The concept of a “learning ecology” is studied and proposed in Corn et al. (2009) to describe the new learning conditions required for students in technology integrated classrooms like those in 1:1 laptop implementations.

Zhao & Frank (2003) assert that technology implementation and initiatives are more likely to be accepted by school community members if a collaborative technology learning ecology protects, inspires or “feeds” them. Such an ecology would allow educators’ adoption of large-scale technology use to flourish. Their study suggests that supporting collaboration and sustaining it may be an important leadership action in helping teachers to accept technology in schools, calling for more research in this area.

As large-scale technology implementations increasingly appear across the country (Bebell & Kay, 2010; Cavanaugh, Dawson, White & Valdes, Ritzhaupt & Payne, 2006; Penuel, 2006; Shapley, Sheehan, Sturges, Caranikas-Waler, Huntsberger & Maloney, 2009; Zucker & Light, 2009), schools will need to learn to use existing district resources like PLC structures and prior training or expectations around collaboration to frame these technology programs for their constituencies. This study, therefore, explores whether superintendents see PLCs and their collaborative constructs as mechanisms for gaining acceptance for large-scale technology initiatives.

It is unclear whether school and district leaders recognize PLC constructs as a powerful tool in their technology leadership toolkits, or if they use them to frame technology implementations. If teacher adaptation to teaching and learning with technology is supported or achieved by the co-implementation of collaborative structures like PLCs, many schools may be closer to acceptance of implementation than is evident.
Thus, this qualitative study explored the link between collaboration structures like those defined in PLCs and the leadership actions required to gain acceptance for large-scale technology initiatives in 5 school systems. Using frame theory and PLC constructs to guide analysis, my study sought to answer the following research questions:

1. What are the superintendent’s expectations around collaboration?
2. What is the relationship between district expectations for professional collaboration and acceptance of large-scale technology initiatives in school districts?

My study explores whether framing the implementation of large-scale technology initiatives as collaborative work (or the work of existing PLC structures) helped to gain acceptance for them. This study bridges existing literature with an examination of educator practices relative to the role played by PLC structures (which may already exist in implementing districts) and describes how PLCs and collaboration structures may or may not be important to district leaders framing such implementations.

This study also adds to existing literature on frame theory, PLCs and collaboration, and to organizational management literature that addresses how organizations adapt to workplace innovations (Benford & Snow, 2000; Christensen, Horn & Johnson 2008; Eaker, Dufour & Burnette, 2002; Takahashi, 2010). This study also adds to growing research on technology leadership (Anderson & Dexter, 2005; McCleod & Richardson, 2011) and descriptions of leadership practice at the district level (Coburn, 2006; Coburn, Toure, Yamashita, 2009; Honig & Venkatswaran, 2012). Literature in these topic areas serves as foundation for this study.
Literature Review

The literature review (Chapter 2) for the larger study described the role of the superintendent and technology leadership team members. Professional learning community (PLC) constructs and frame theory served as theoretical frameworks for my individual study.

My review of relevant professional learning community (PLC), collaboration, innovation, and technology leadership literature is organized to help the reader understand the forces, policy, and educational trends documented in research literature to date that surround the problem identified by this study. The review first describes PLCs and their reach and impact in schools. Next, the review explores research about technology use in schools and existing technology leadership research. Literature on learning organizations, communities of practice, and professional learning communities is discussed as a contemplation of how leaders can effectively help their schools and systems accept technology and advance its use in practice. The literature review concludes with a description of structures used to support innovation implementation in schools.

PLCs: A Popular Collaborative Framework in Schools

Professional learning communities (PLCs) have evolved to incorporate research from business, sociology and education sectors. Professional learning communities exercised in schools incorporate the concepts from social-cognitive theorists, (Vygotsky, 1986; Wertsch, 1985) “professional community” (Louis, Marks & Kruse, 1996; McLaughlin & Talbert, 2001, 2007), organizational learning (Coburn & Stein, 2006; Honig, 2008; Huber, 1991; Ortenblad, 2002; Senge, 1990) and communities of practice
These constructs purport to allow schools and educators to implement reform, gain new knowledge, withstand change, and remain agile in creating educational innovations designed to address student learning needs. Table 6 summarizes the popular PLC construct definitions used widely in schools today and which will be used as the working set of collaborative constructs in this study.

Table 6:

**PLC Constructs and Descriptions**

<table>
<thead>
<tr>
<th>PLC Construct</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared work</td>
<td>Shared understanding of the goals the group is working on for the school and their part in achieving the goal.</td>
</tr>
<tr>
<td>Collective inquiry</td>
<td>Group regularly reflects on where they are relative to shared goals and progress made toward those goals.</td>
</tr>
<tr>
<td>Collaborative Teams</td>
<td>PLC educators work together interdependently within collaborative teams to achieve common goals for which they are mutually responsible.</td>
</tr>
<tr>
<td>Action Orientation/Experimentation</td>
<td>Teams turn learning and insights into action. They recognize the importance of engagement and experience in learning and in testing new ideas.</td>
</tr>
<tr>
<td>Continuous Improvement</td>
<td>Members seek better ways to achieve mutual goals and accomplish their fundamental goals.</td>
</tr>
<tr>
<td>Results Orientation</td>
<td>Teams assess their efforts on the basis of evidence to inform and improve their practice.</td>
</tr>
</tbody>
</table>


**Use and Impact of PLCs in Schools**

Schools and districts frequently use the previously described professional learning communities constructs as a means to help frame and manage school reforms (identify and solve problems). Professional learning communities are identified as a mechanism for changing professional practice and generating district-wide improvement (Harris &
They are also cited as capacity building structures for teachers learning to create sustainable school improvement, (Saunders, Goldenberg & Gallimore, 2009; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006) and as ways to increase efficacy and use of time when teachers learn new technology skills (Seels, Campbell, & Talisma, 2003).

Schools and districts also use PLCs to cultivate collaboration to support student achievement and create collective action around it, linking solidly to movement practices described in the frame theory literature summarized in Chapters 1 and 2 around collective action in social movements (Benford, 1993). The term “PLCs” and the idea of collaboration are, therefore, often used interchangeably and describe how educators collaborate or join together with a common set of student achievement aims.

Lee, Zhang & Lin (2011) explored how PLC work positively affects team trust, collective efficacy, and commitment to students. Studying PLCs and their potential, Hargreaves (2007) identified PLCs as a means to solve organizational learning, trust, efficacy, diversity, justice and sustainability problems through collective organizational learning. Mitchell & Sackney (2007) cited PLCs as a vehicle to join schools and their constituencies together to solve engagement problems in the larger school community. Professional learning communities have also been studied in a manner that documents how schools develop collective understandings over time via PLC work, thereby contributing to school cultural norms (Kruse & Louis, 2007).

The work of McLaughlin & Talbert (2007) cites PLCs in high schools as a vehicle to transform school and district cultures and increase collaboration. This work should also be balanced with later work by Talbert (2009) indicating that while PLCs increase cultural transformation and collaboration, many schools are PLCs in name only. Some
research indicates that PLCs may actually increase inertia on new initiatives, as they can serve as strong cultures of their own with strong traditions and established practices with which to contend (Van Lare & Brazer, 2013).

However, overall, the majority of research indicates that PLCs appear to positively impact teaching and learning outcomes. Vescio, Ross and Adams’s (2007) American/European analysis of eleven PLC studies indicates the, “collective results of these studies suggest that well-developed PLCs have positive impact on both teaching practice and student achievement,” (p. 80). Professional learning communities may, therefore, also have a positive impact on technology implementation work—and serve as an effective growth medium for a district’s emerging technology learning ecology. The next section of this review discusses the role of technology in schools and technology leaders as elements of this new learning ecology.

Technology Use In Schools

Discussion of ubiquitous computing and the rise of mobile instructional devices in American classrooms were discussed at length in Chapter 2. Due to these educational computing trends, a major concern for many current school and district leaders is not whether they will lead their districts through some type of technology/hardware program 1:1 computing adoption but how to do so effectively. District leaders must decide if the technology schools are now providing adds value as they prepare students. Leaders must also determine whether the district structures exist to train, develop, and sustain educators learning to effectively employ the new technology. The next section of this review, therefore, discusses existing literature on technology leadership in schools.
Technology Leadership

Anderson & Dexter’s (2005) study of leadership in emerging technology-integrated environments confirmed the critical role of technology leadership. Sara Dexter (2011b) also examined organizational learning outcomes in technology-integrated environments indicating that collaboration in these environments is key, citing “distributed leadership” (Spillane, 2005) as the most effective potential leadership practice in the integration of technology.

Many quantitative studies exploring the correlation between aspects or conditions of implementation and use exist and assist in determining school- and district-based forces and their impact on teacher technology use, integration into instruction, and inclusion in student productivity and production in the classroom (Bebell & Kay, 2010; Bebell & O’Dwyer, 2010; O’Dwyer, Russell & Bebell, 2004; O’Dwyer, Russell & Bebell, 2005). These studies also do not directly identify leadership competencies most important for elevating student achievement through technology use or the leadership actions that best support teachers accepting technology in their districts.

A Technology Learning Ecology for Educators

Other research on technology use and teacher belief systems force researchers to consider the possibility that strong and effective technology leadership may not be a discrete set of skills and skill combinations, rather, a set of other forces and actions intermixing to create an educator learning ecology (Baylor, 2002; Flanagan & Jacobsen 2003; McCleod & Richardson, 2011; Russell, O’Dwyer, Bebell, & Tao, 2007; Zhao & Frank, 2003). Spires, Oliver & Corn (2011) in their call for the “new learning ecology”
in 1:1 technology settings (one computing device for every student) define curriculum and instructional strategies to increase teacher integration of technology in classrooms.

The lack of specific scholarship or guides for analysis of the role of leadership in creating effective technology-based environments have led Dexter and Anderson to indicate that it may be: “more essential for a school to distribute leadership and become a ‘technology learning organization,’ where administrators, teachers, students and parents, together work on how best to adapt new technologies to improve student learning,” (Anderson & Dexter, 2000, p. 17). Indeed, effective technology leadership may rely heavily on a distributed leadership model (Spillane, 2005a) or a strong professional learning community model exercised around a technology implementation. Using PLCs as the lens for analysis, it is this mix of instructional change, technology use, learning organization constructs, and the leadership actions to create and support technology implementation that this next section of the literature review will explore in more depth.

**Collaborative Learning Community and Innovation**

Models of reform and change in schools abound and are long-studied (Evans, 2001; Fullan, 1999; Fullan, 2001; Fullan & Hargreaves, 1992). The concepts of leading and change making via learning organization constructs (Ortenblad, 2002; Senge, 1990) are well described. Literature on how individuals best learn (Knowles, 1970), learning organizations, communities of practice (CoPs) (Wenger, 1998; Wenger 2000), and professional learning communities (PLCs) (Eaker, Dufour & Burnette, 2002; Dufour, Dufour, Eaker & Many, 2010), therefore, all focus on the idea that individuals and organizations learn best by acquiring new knowledge and adapting to innovations in a more agile and adept fashion when they do so in collaborative teams.
PLCs, Technology Implementation and Framing Innovation

Few studies link or discuss the relationship between PLCs and technology implementation—particularly when the technology use and learning means devices in the hands of K-12 students in a 1:1 fashion. Existing studies never directly address using PLCs as a means of encouraging technology integration into instruction. Technology studies that mention PLCs or collaborative constructs highlight the importance of developing community collaboration by extending time and tools in PLCs (Williams, Atkinson, Cate & O’Hair, 2008); as an effective means for principals to learn technology skills (Gerard, Bowyer, & Linn, 2008); and in changing teaching and collaboration in higher education settings (Owen & Demb, 2004).

However, PLC constructs are implied in existing business and human resources literature as suggested components of leadership practice. Several articles indicate that the ability to create a shared mission, vision or value system for technology use is important (Christensen, Horn & Johnson, 2008; Flanagan & Jacobsen, 2003; Robertson, 2007; Robinson, Lloyd & Rowe, 2008; Schrum, Galizio, Ledesma, 2011). Williams et al. (2008) indicate that teaching teams how to learn together (collective inquiry) is a primary leadership activity required in innovative environments. Many scholars cite effectively convening and managing collaborative teams as important for technology, business, educational, and organizational leadership (Christensen et al., 2008; Hughes & Zacharia, 2001; Leithwood, Mascall, Strauss, Sackes, Memon, Yashkina, 2007; Robinson et al., 2008; Spillane, 2005a; Spillane 2005b; Spillane & Healey, 2010; Spillane & Diamond, 2007; Williams et al., 2008; Zhao & Frank, 2003). Finally, an action orientation and results orientation are cited as important in organizations implementing technology
innovations of any type (Anderson & Dexter, 2000; Robinson, Lloyd & Rowe, 2008; Schrum et al., 2011; Seashore, Dretzke, & Wahlstrom, 2010; Williams, 2008).

The PLC as a change and learning structure is directly and indirectly promoted in organizational, business and human resources research as well as in education literature. It is in the work of reform and innovation that frame theory and PLC work meet and mesh (Benford & Snow, 2000; Snow et al., 1986). Work conducted in PLCs often identifies problems (Dufour, Dufour, Eaker & Many, 2010) and seeks blame or cause for problems (diagnostic frame). A PLC’s action orientation around its shared mission, vision and values by nature identifies goals and solutions for the identified problems (prognostic frame) as part of collective inquiry and desire for continuous improvement. A PLC model also seeks to use collective action to solve problems (motivational frame) as part of a PLC’s action orientation/experimentation work. By nature, PLCs take on the work of the three major core framing processes identified in frame theory. Identifying new solutions to problems and taking action is at the root of innovation (Christensen et al., 2008). Professional learning communities, therefore, could be seen as an ideal collaborative structure for mobilizing and framing reform and innovation for educators, particularly the innovation of large-scale technology implementation in schools in the coming decades. My study, therefore, explores and describes whether and how superintendents handle professional learning communities as part of framing large-scale technology implementations in five school systems.
Methodology

The methodology of the larger study was detailed in Chapter 3. Throughout the remainder of this section, methods are discussed for this PLC study that complement larger study methods.

Within the context of the larger study (Arnold, Cohen, Flanagan, Nolin & Turner, 2014), this individual study was expressly interested in the role that superintendents’ expectations around professional collaboration have on acceptance of large-scale technology implementations. This study examines the work of the superintendent and his/her technology leadership teams as they implemented technology initiatives. In the study districts, these large-scale technology initiatives include one laptop for every child (1:1) or bring your own device (BYOD) programs that sought to allow one device to be used for every child’s educational program in the school system. In particular, this study focuses on the potential role collaborative constructs have in implementation of these programs, by exploring the existence of PLC constructs in the work around technology implementation. Study participants are superintendents and members of each district’s technology implementation team named by the superintendents as important to the initiatives. Specifically, the study focuses on the following research questions:

1. What are the superintendent’s expectations around collaboration?
2. What is the relationship between district expectations for professional collaboration and acceptance of large-scale technology initiatives in school districts?

The PLC framework espoused by Eaker, Dufour & Burnette (2002) as well as prognostic, diagnostic and motivational frames defined in Benford & Snow (2000) and Snow et al.,
(1986) are used to answer these questions. This study’s context and its methods for data collection and analysis are described below.

The Study Context

In the following sections, the type and methodology of this study are described. This study is one of five interconnected studies (Arnold, 2014; Cohen, 2014; Flanagan, 2014, Nolin, 2014; Turner, 2014) emerging from the larger unified study (Arnold et al., 2014) and methodology. The overarching study sought to understand superintendent actions to gain acceptance for large-scale technology initiatives. The data for this individual study was collected as part of the larger research study described in Chapter 3.

Data Sets

Interviews and documents were the primary data sets for this study and were summarized in Chapter 3, Table 3 and 4. A unified interview protocol was used to obtain data for the larger study (Arnold et al., 2014); within that protocol, specific data for my study was obtained from a few selected questions detailed in the interview questions section below.

In order to address the study research question relating to the superintendent’s expectations around collaboration in the school system, the following interview questions were asked of all interviewees selected:

1. What are your/the superintendent’s expectations around collaboration?
2. Who helps you/others to implement the technology program expectations?
3. How did you/does the superintendent work with these individuals to implement the technology program?
In order to address my study’s second research question relating to how district expectations around collaboration influence the acceptance of large-scale technology initiatives, the following questions were asked to gain insight relative to how PLCs and technology connected in each district:

4. How do people work together to understand how to use the new technology?

5. How are expectations for this initiative communicated?

6. In what ways did your leadership team work with each other to implement the plan?

7. Describe formal or informal structures at play in the district around educator collaboration.

8. What helped to ease the implementation of this initiative in your system?

9. What else was being implemented at the time of the technology initiative?

These questions can also be found in the larger study’s complete interview protocol in Appendix E.

Similarly, in document review, my study utilized school and district strategic improvement and goal documents, professional development plans, and social media samples, in order to answer questions related to the collaborative reform work required to implement a technology initiative. The next section describes analysis procedures used in my study.

**Analysis**

Interviews and documents were analyzed to look for ways in which interviewees discussed technology implementation and whether they mentioned professional learning
communities (PLCs) constructs or other expectations for educator collaboration when discussing the technology implementation. This type of analysis revealed whether collaborative expectations were a part of the technology implementation process and if those expectations or constructs were connected or leveraged to execute the technology initiative in some manner.

**Provisional “start list” coding for specific PLC constructs.** A coding provisional “start list” for PLC constructs (Eaker, Dufour & Burnette, 2002) was applied to study data. The coding scheme sought to determine if PLC constructs were present in the story superintendents told about collaboration and gaining acceptance of the initiatives. This list, contained in Appendix M, allowed for determination of whether there was any relationship between the district's expectations for professional collaboration and/or PLCs, the framing actions of the superintendent, and acceptance of the technology initiatives in the system.

**Research journals.** Research journals allowed me to write about emerging ideas and analyses in order to capture ideas before they were forgotten. Research journals also created a document trail or chain of evidence (Yin, 2009) for research decisions as they emerged. “Jottings” of ideas (Emerson, Fretz & Shaw, 1995), were made throughout the interview sessions, and emerging analyses during and immediately after the interviews were captured. Within 24 hours of each interview, a summary statement of ideas related to that interview was completed. As analyses moved within and across cases, the research journal was used to write initial summaries of the data while the interview experience was still fresh.

**Analytic memos.** Analytic memos were employed to track thinking and
development of ideas throughout the coding process. Analytic memos “reveal the researcher’s thinking process about the codes and categories developed thus far,” (Saldana, 2003, p. 157) and were intended for use as a place to move the initial jottings and summary statements from the interview process into more formal written mode. The following journal headings were employed: field observations, ideas connected to this day’s data, insights from today, connections to other ideas, and other notes. Analytic memos tracked any nexus between PLCs, different types of framing actions, and the intensity and frequency of this overlap.

Analysis took place concurrently with data collection, beginning with the use of research journals and memos. Formal analysis of the data collected included the use of a start list of codes from the larger study, (Arnold et al., 2014) and then a recoding and analysis for my PLC study. The same phases of data analysis noted in the larger study were employed for this more specific focus of PLCs and technology implementation within the larger study and culminated in Within-Case Analysis and Cross-Case Analysis. Detailed descriptions of these procedures are contained in Chapter 3. Differences in analysis for my study were applied toward the unique research interests of this individual study. These differences are discussed in the descriptions of the additional coding and subsequent analysis and theming of the data detailed in upcoming sections.

Coding

Coding followed the cyclical and iterative steps noted in the larger study's coding plan as illustrated in Figure 2. As coding occurred for the larger study, (Arnold et al., 2014) jottings were made around my study’s research questions and sub questions related to PLCs, collaborative culture, learning, and technology implementation. These jottings
served as markers to allow for analysis of key areas in more depth using the PLC-related coding detailed below.

Specifically, my study sought to identify superintendent collaborative expectations and to determine if the superintendent used PLC expectations or constructs to frame the technology implementation. Particular attention was paid to areas of motivational framing, which, early in the coding process, indicated a shared presence with collaboration, shared time, action orientation and collective inquiry. Notes were made of this indication in early coding and analysis phases for in-depth follow up for this PLC study’s later coding procedures.

My study planned to then employ value coding or magnitude coding (Saldana, 2003) relative to the superintendent’s and leadership team’s belief systems as revealed through interview responses related to PLC constructs. Such coding was intended to allow for analysis of the importance of PLCs to the superintendent’s vision, to implementation, or to reveal if the superintendent valued PLCs or some aspect of PLCs more than others. However, in the practical analysis of this data, it was clear that simply counting the numbers of mentions of PLC constructs could not indicate the level of value or the magnitude of PLCs in a system. Instead, the depth of the interviewee descriptions and the confirmation of those descriptions by other technology leadership team members served to denote the value and magnitude of the construct in the system. This additional coding step was not necessary or appropriate to achieve the aims of the study and was, therefore, not conducted. I was able to determine PLC magnitude by first looking at the number of mentions of PLC constructs that overlapped with framing codes in superintendent transcripts. These numbers and overlaps served as a cue to examine the
dually coded language more deeply, reading and analyzing each coded sample to
determine potential themes or relationships between framing and PLCs. In subsequent
interviews within a district, other interviewees verified the superintendent statements.
Direct quotes relating to PLCs, their existence, and importance were gathered, and the
number of corroborations and repetitions that occurred across a district’s interviewees, in
concert with the content of the coded text, helped to determine the value and magnitude
of PLC constructs in each district. Analytic memos traced the links between
superintendent framing actions, PLC discussions, and pattern development, aiding in
development of theory.

Theme Development and Analysis

It was predicted that patterns of leadership action might be identified in how the
superintendent and leadership teams encourage educator collaboration relative to the
technology implementation. Patterns emerged due to the overlap and substance of PLC
codes related to framing—particularly related to constructs of collaboration and shared
time in superintendent and other interviewees’ responses. Examination of how these PLC
coding and frame theory patterns worked together created the themes for this study’s
individual findings as described in sections below.

Within-case analysis. After jottings and memos from the larger study (Arnold et
al., 2014) were organized, within-case analysis relative to PLCs was conducted. The
purpose of this level of analysis was to allow the researcher to explore, explain and
predict areas of interest within each case. As in the larger study, a case is defined as a
school district implementing a large-scale technology initiative. Within-case analysis of
PLCs and technology allowed for examination of where PLC constructs matched up with
identified diagnostic, prognostic, and motivational framing noted in the larger study. Professional learning community constructs were also examined as they related to moments of identified *resonance* or *constraint* within the districts. The overlap of framing, frame development (strategic processes), resonance codes, and constraint codes with PLC construct codes served as the foundation for within-case analysis. Professional learning community constructs and their place within the leadership planning and execution process and district collaborative expectations were first identified. In the journal, these constructs were then described relative to how the superintendent framed the initiative and in how he conducted district learning as he sought to gain acceptance for the technology implementation.

**Cross-case analysis.** The next step of analysis in this PLC study, *cross-case analysis*, allowed the researcher to explore and describe connections across the cases. A cross-case analysis in a study of technology and PLCs allowed for generalizations about how the patterns of collaboration between superintendents and their leadership teams and among educators in the districts influenced the acceptance of the technology initiatives across five school systems. Interim summaries, the thematic conceptual map, and the researcher’s analytic memos generated throughout the early and within-case analysis/coding process of the larger study proved helpful in conducting this kind of analysis. Professional learning community constructs across the districts were compared; in this comparison process, the patterns across districts relating to PLCs in technology implementation were revealed.

From these trends, theory emerged. At the start of the study it was theorized that some superintendent and team leadership actions would be common and rely on
collaborative constructs to create a technology learning ecology. Such cross-case patterns were identified, and descriptions of the actions and use of PLCs were documented as findings.

Limitations and Delimitations of Research

Limitations address problems in data collection, unanswered questions from participants, or sampling challenges (Creswell, 2011). This study relied on interview and document data from five small- to middle-sized Level 1 or 2 school districts of fewer than 5,000 students. The study asked participants to recall planning stages of the implementation; as a result, all experiences were self-reported by interviewees, and are, therefore, limited by memory and embellishment or the limited interpretation of the reporters. These limits were discussed in detail in Chapter 3 of the larger study. Specific to PLCs and district collaborations, interviewed superintendents and leadership teams did not always accurately represent or understand the nature of collaborative culture in the district at the implementation level—especially relating to the 1:1 implementation. Alternatively, some interviewees had a limited viewpoint around collaborative culture within the district. Technology integration specialists, for example, often claimed to have no knowledge of the framing or acceptance work, while the superintendent named them as individuals key to gaining acceptance. The technology directors/network administrators in the Washington and Adams systems could not describe the PLC, professional development or collaborative structures in the district at all, nor could they detail the instructional or vision work done around the technology initiative as their participation in the work may have been limited due to their status as technicians and not educators.
Validity and Reliability

Methods of analysis and coding employed for my study have been discussed in prior sections. This final section of methods discussion relies on the advice of Miles & Huberman (1994) relative to the validity and reliability of methods which advises that researchers check for representativeness of the data relative to the phenomena by “checking for researcher effects…triangulating across data sources, and deciding which kinds of data are most trustable,” (p. 263). The same measures used to ensure validity and reliability employed by the larger study (Arnold et al., 2014) as described in Chapter 3, were also employed for my study. For my study, I sought to ensure that the ideas and conclusions have come from the data as confirmed by corroborating with larger study team researchers and engaging in a process of asserting alternative explanations and testing assertions. In employing this process, I sought to uphold Yin’s (2009) recommendations for triangulation within this PLC study.

Researcher Bias and Assumptions

As an education practitioner with experience working and leading PLCs and technology implementations, potential researcher bias in this PLC study had to be addressed. The use of unified interview protocols and scripts used for the larger study, use of a coding “start list,” the iterative process of writing and checking with the research team, consistently questioning assumptions all served to address these potential biases. Merriam (2009) indicates that it is often thought that a case study is inherently more biased than other types of research because cases are selected based on a researcher’s prior notions. Such concern was addressed in this individual study, as I had no prior knowledge of collaborative expectations, structures, or the existence of PLCs in the
selected districts. Presence of a PLC in study districts was not a criterion for selection or inclusion in this study.

Results

This study intended to explore superintendents’ expectations for collaboration in school systems and describe any relationship existing between district expectations for professional collaboration and the acceptance of large-scale technology implementations. It was hypothesized that the existence of PLCs or aspects of PLCs may have had a relationship to how superintendents were able to frame the work of implementing the technology initiative—thereby assisting in gaining acceptance for such work.

The findings are reported from general to more specific and address a relationship between PLC and framing work in the technology initiative. First, I describe superintendents’ expectations for collaboration in districts implementing large-scale technology implementations, and second, I describe relationships that may exist between district collaboration and technology implementation. For this study, specific pseudonyms for participants were utilized whenever possible. An overview of study districts and their technology programs, leadership teams and technology implementation history is detailed in Chapter 3; Table 3 details interviewees, their role in the technology initiatives, and their pseudonyms. In the sections that follow, PLCs as they relate to superintendent framing actions, collaborative expectations, and ties to the technology implementation will be discussed.

Core Framing Tasks and PLCs

It should be recalled from the larger study (Arnold et al., 2014) that core framing tasks for reform include diagnostic framing, prognostic framing, and motivational
framing (Benford & Snow, 2000). Frames are then elaborated upon and developed for use through actions like strategic processes and contending with constraints; therein, resonance around the new reform can be created and cultivated (Benford & Snow, 2000; Snow et al., 1986). The findings of my PLC study indicate that the combination of framing and PLC constructs constitutes an important medium—a learning ecology—with which to nurture educator learning about technology and increase acceptance of large-scale technology implementations. The ways superintendents framed the initiative emerged in a pattern relative to the presence or absence of PLC constructs.

With the exception of Bob, the Madison district’s superintendent, analysis in the larger study revealed that diagnostic framing was largely absent from the technology implementation narrative. Bob deliberately diagnosed an equity issue of providing access and computing equipment to students in order for them to “keep up” with other systems as the primary frame for the technology implementation; this was also discussed as a consideration by at least two other interviewees in his district. Meagan, Monroe’s Director of Technology, also mentioned equity when talking about the initiative, but no other interviewee, including the superintendent, discussed or confirmed it in the Monroe school system.

Prognostic framing, or the creation of goals and plans to move forward the initiative, existed in all of the superintendent narratives, although they were described and executed in varied ways. Superintendents and their leadership teams all created prognostic frames, even if there was not a diagnostic frame identifying the student learning problem to be solved with the initiative. Prognostic framing existed in similar
ways in districts regardless of how often and to what degree there was overlap with
discussion of PLC constructs.

Finally, motivational framing was more frequently described by a majority of
interviewees in districts where PLC constructs were more frequently identified.
Motivational framing was most often associated with the actions of the main leader or
“key framer” of the technology implementation. Each district had one person—a key
framer of the initiative—with the exception of the Monroe district whose initiative was
co-led by two staffers: Tim, the former high school principal, and Meagan, the Director
of Technology. Table 7 and 8 indicate the district, superintendents, and key framers for
each district’s technology implementation and the type of technology initiative framing
employed by each individual.

Table 7

Type(s) of Framing Used by Superintendent in Technology Implementation, by District

<table>
<thead>
<tr>
<th></th>
<th>Adams</th>
<th>Jefferson</th>
<th>Madison</th>
<th>Monroe</th>
<th>Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prognostic</td>
<td>Motivational</td>
<td>Diagnostic</td>
<td>Motivational</td>
<td>Prognostic</td>
<td>Motivational</td>
</tr>
</tbody>
</table>

Table 8

Key Initiative Framers Type(s) of Framing Used in Technology Implementation, by District

<table>
<thead>
<tr>
<th></th>
<th>Adams</th>
<th>Jefferson</th>
<th>Madison</th>
<th>Monroe</th>
<th>Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of Technology</td>
<td>Prognostic</td>
<td>Motivational</td>
<td>Prognostic</td>
<td>Motivational</td>
<td>(Superintendent was key framer)</td>
</tr>
<tr>
<td>High School Principal</td>
<td>Prognostic</td>
<td>Motivational</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School Assistant Principal</td>
<td>Prognostic</td>
<td>Motivational</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Broadly viewed, the data suggest that certain types of framing or the narrative of framing may have a relationship to the presence of PLC constructs in a system implementing a large-scale technology initiative. For example, motivational framing was present more often in districts where a greater number or more descriptive discussion of PLC constructs were mentioned (namely Washington and Monroe), suggesting a possible relationship between PLCs and motivating teams of teachers to participate in the technology initiative. Financial constraints were identified more consistently in districts that did not discuss or identify PLC constructs frequently or in great depth (Adams and Jefferson), possibly indicating a potential buffering or minimizing effect on worry over potential financial barriers. Analysis of resonance and constraints relative to PLC constructs further illuminates this finding and is described below.

**Resonance vs. Constraints**

Across districts, motivational framing actions were described more often in districts that had created and employed, in some fashion, PLC structures for educator learning. Using selected patterns from the larger study, moments of resonance that were also described as motivational framing actions were identified. Comparing these areas of framing to the presence of PLC constructs revealed that PLC constructs were connected more often with moments of resonance (places where greater understanding occurred and momentum began) versus areas of district constraint, (barriers to technology implementation frames diffusing through the school system) when participants described the technology implementation. The places where participant descriptions of PLC constructs and identified moments of resonance or constraints overlapped within the initiative are represented in Figure 4. However, while Figure 4 demonstrates a possible
relationship between PLCs and instances in implementation when participants identified a moment of resonance with the technology implementation, it is in the content of participants’ descriptions of collaboration that a possible connection between PLC constructs and increased resonance within the implementation is highlighted. These quotes support and expand the ideas sketched by Figure 4.

In particular, moments of identified resonance were described as collaborative ventures where experimentation and inquiry were shared among professionals that built initiative.
momentum, as described in the Jefferson district by Grace, the key farmer/high school assistant principal:

Every time they came back [from visits to other tech-implementing sites] they said “Oh, we have to do that!” It was spreading that word, or, I went and did research of the positive impact so I was able to share that as well, to help support the financial part.

Similarly, Bob, the Madison superintendent, indicated that these collaborative moments created resonance because they actually served to help buffer the stresses of implementing an innovation like technology-integrated instruction and use in schools:

There’s a leading edge which…where you’re comfortable using something that’s fairly new but is not so new that it is not tested and tried. And if you support that leading edge--that technology used in general would move over and your curve would flatten out so you get more and more teachers using that. And over the course of the time Brett [the key framer] was here we continued to sense this. So when we put Smart Boards in we just didn’t target the people who were the best teachers we targeted the people that were using technology that were in the classroom. Because once people saw [others] using smart boards it was “that’s pretty neat” …but to have the opportunity to have those teachers display and model and talk about the success they had in Smart Boards or whatever other

---

12 The Smart Board interactive whiteboard operates as part of a system that includes the interactive whiteboard, a computer, a projector and collaborative learning software. A projector connected to the computer displays the desktop image on the interactive whiteboard, which accepts touch input from a finger, pen or other solid object.
piece of technology…it really has worked, you’ve flattened that curve out. We still have some people who are, you know, lagging behind.

Most directly, Jackson, the Monroe superintendent, indicated that moments of resonance were directly tied to the work of PLCs, namely the PLC constructs of *shared goals* and *collective inquiry*, which his district also connected to new statewide mandates in teacher evaluation:

- Now once you get it on that level, keeping in mind that the individual teachers are developing professional development plans, both for leisure and for the evaluation system, you hope that -- it all comes together, I mean, they’re actually supposed to connect their goals to either the school improvement or district wide goals.
- And since we’re now coordinating all those goals--that resonates right through to the classroom.

On the whole, constraints were articulated most prominently as money or funding strategy discussions in the Adams and Jefferson systems: “we could not ask [the town] for money [for this],” was a powerful statement shared by the Jefferson key framer and high school assistant principal, Grace. However, constraints related to the idea of gaining acceptance of the initiative were identified in ways that highlighted when collaborative or PLC constructs were absent as noted by Ethan, Washington former middle school principal, he indicated that technology use by teachers:

- may still be scary or pressuring [to] some, but that's probably coming from an awareness that their colleagues are doing things and if I'm a teacher that isn't able to do some of that stuff, how will the students perceive or be engaged differently
in my class? That's just natural when people want to ensure they're on par with anybody else.

In the absence of PLCs or use of PLC constructs to guide and nurture technology integration, the cultural constraints of teachers comparing skills rather than working together on a common aim was highlighted.

Similarly, Bob, the Madison superintendent, leader of the longest running large-scale technology initiative in the study, now in its tenth year, described constraints identified in the implementation in the following manner:

I think if I’d been on board as superintendent earlier I might have tried a more collaborative approach to get teachers really excited about it. Brett’s [the key framer] idea was we started in middle and I think ended right here [gesturing to indicate not much farther along a continuum].

Both Bob, the Madison superintendent, and the key framer/former technology director, Brett, indicated that a lack of ease of collaboration across the system due to geographical constraints and a lack of buy-in on the part of key principals in the system kept true technology collaboration from occurring. This analysis further indicates the possible role PLC collaborative constructs could play in framing technology implementation in order to cultivate resonance and thereby gain acceptance for such initiatives.

**Superintendent Expectations Around District Collaboration**

In all five districts, superintendents articulated clear expectations for educators to collaborate. These expectations were evidenced through descriptions of *formal PLC structures* in the Washington and Monroe districts and through descriptions of *shared time*, in all five districts.
**Formal PLC structures.** The Monroe district was the only study district that housed a collaborative model incorporating all PLC constructs, naming them directly as such, while deliberately describing them as connected to the superintendent’s vision. As Jackson, the Monroe superintendent, described his instructional vision, he indicated that he sees technology and teaching teachers to teach with/use technology through PLC work as a means of achieving his system goals of creating “more differentiated instruction” and “a smaller 1:1 intervention separate from special education.”

At least two PLC constructs were present in all five of the sample school systems’ narratives as described by at least two interviewees in the system. Formal professional learning community structures (PLCs) were present in the Washington school system at the middle school level as well. In interviews and in strategic planning documents, both the Washington and Monroe superintendents and at least one other interviewee from those districts described collaborative structures using all of the PLC constructs (*shared mission/vision/values, action orientation, collective inquiry, continuous improvement orientation, shared time and collaborative teams*) as present and used as an expected collaborative vehicle in the school system.

Two systems indicated they had formalized PLCs or collaborative constructs like PLC teams, but this claim was not confirmed. David, the Jefferson superintendent indicated, “we did a lot of work with our leadership team and PLCs,” but there was no evidence of this beyond his discussion of it. The key framer of his district’s technology implementation, Grace, spoke with detail about monthly technology collaboration opportunities she led at the high school, but they were not described as fully formed PLCs. Norman, the Adams superintendent, stated that “collaboration is mandatory” in
his district, but did not articulate descriptions of formalized PLC or reliable collaborative
teaming structures within the system. He also indicated that how he handled
collaboration was an area he would do the initiative differently if he were running it
today:

I think where teams are higher functioning I see more robust implementation.

What I'm learning through this is I'd probably do more concurrent work on
collaboration. I assumed people would want to work together. That's been a great
assumption for some of the folks, but not a universal assumption…. our first
meeting we called “mandatory collaboration.” It was sort of a joke in [the district]
It's like the districts that have a community service requirement -- “you will
volunteer!” We haven't even done a good enough job with that yet because there's
not a culture of collaboration here.

In contrast, Norman’s district instructional integration specialist, Jim, discussed pockets
of collaborative teaming structures including teacher-led PLC teams, at great length,
which were confirmed by his other central office implementation team members (Howard
and Paul). However, he, too, indicated formal PLCs were not present.

Shared collaborative time. To support the superintendent’s expectation for
collaboration, all systems used shared time devoted to the technology initiative. All
districts did this in the form of full-day professional development days. All districts,
except for the Jefferson and Adams districts, used half-day or “early release” professional
development days for technology learning. All systems identified the use of regular
department or formal “collaboration time,” for technology collaboration, and all districts
but Jefferson referred to formal graduate study time on the topic of technology learning
provided within the school system. Table 9 summarizes what superintendents described when asked about informal and formal collaboration structures in the district. These descriptions of shared collaborative time were corroborated by at least three interviewees in each district.

Table 9

*Description of Superintendent Expectations for Technology Collaboration Time in Study Districts*

<table>
<thead>
<tr>
<th>Description</th>
<th>Adams</th>
<th>Jefferson</th>
<th>Madison</th>
<th>Monroe</th>
<th>Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full day professional for entire school system before students arrive</td>
<td>5 days</td>
<td>1 day</td>
<td>1 day</td>
<td>3 days</td>
<td>2 days</td>
</tr>
<tr>
<td>Half day professional time for entire school system</td>
<td>None</td>
<td>None</td>
<td>1 day every other month (2 hours)</td>
<td>1 day weekly “Technology Share Days” (3 hours)</td>
<td>3-4 days per year grade level dependent</td>
</tr>
<tr>
<td>Collaborative time within school day</td>
<td>Varied by grade level</td>
<td>1 day per month after school, varied options within school day</td>
<td>Time varies yearly, but conducted virtually via “Distance Learning Center”</td>
<td>Varied by grade level</td>
<td>Varied by grade level</td>
</tr>
<tr>
<td>Graduate Coursework of 32 hours or more for college credit or other perks</td>
<td>All staff participate, graduate credit optional</td>
<td>Staff self-selected</td>
<td>All high school staff: year long</td>
<td>Staff self-selected; technology perks given to participant</td>
<td></td>
</tr>
</tbody>
</table>

All superintendents indicated that they valued collaboration in general, in that they made it a priority to ensure scheduled shared time and a shared purpose for getting together. The superintendents’ expectations for *shared collaborative time* were present in all of the studied districts and were mentioned by all of the interviewees.
Descriptions of Collaboration Related to Technology Implementation

While all district superintendents indicated that collaboration is (a) seen as valuable, (b) expected, and (c) provided for in terms of scheduling/naming shared time, superintendents did not necessarily make explicit links between technology implementation, professional learning community work, and collaboration expectations or structures. They simply made shared time and group professional development opportunities available.

Superintendents did not, however, in discussion or written plan documents, or with their technology implementation teams, detail how collaboration groups would engage with technology expectations. Even without an articulated vision or discussion of collaborative expectations with their teams, four of the five superintendents described detailed internal expectations for collaboration deliberately related to the technology implementation. Alternatively, David, superintendent from Jefferson, mentioned collaboration, but did not describe these collaborations with any detail or with deliberate connection to or vision for the technology initiative, or his framing of it. Superintendents did use the full set of PLC constructs to describe a collaborative learning ecology linked to the technology implementation for their own learning, but described technology professional development experiences as the primary mode of educator collaboration across their school districts.

PLCs and superintendent technology learning. Superintendents indicated they knew the value of PLCs when seeking to understand and implement innovations or school reforms and their own learning, but they were not able to translate or “scale up” those learning ecology conditions to the district at large. As an example, Adams
superintendent, Norman, stated that he allowed Paul, the district’s key framer, to engage in and lead the collaborative learning and his job was simply to deal with the financial and logistical elements of the implementation: “my vision is… I get kids get what they need, when they need it… the work of a central office is really to provide the space for that to happen and stay out of the way as much as we can…. Paul is incredibly talented in what he does, and I turn him loose; again, if he's successful, we're successful.” In Jefferson, Grace, the key framer of the initiative, worked diligently with her “vanguard” team (her term for technology leadership team) with the full support and participation of David, the superintendent. He even indicated he had done training in PLCs in the district that year, but no connection was made for staff around PLC collaborative work and the technology initiative in his implementation narrative. Indeed, Grace, Jefferson’s key framer/high school assistant principal, indicated that the technology leadership team was, at times, about using it to teach David the need for the technology initiative: “Honestly, it was the superintendent who needed the most convincing…and we met weekly…. helped with the ‘how-to’ part.”

Similarly, Jackson, the Monroe superintendent, stated he valued PLCs, had them in his strategic plan, and sought regular meetings with this team to discuss learning about how to best lead the initiative. However, he often deferred to Meagan, the technology director, in terms of how she would want to arrange support around the initiative. Meagan did not cite collaboration or PLCs as chief among her concerns, stating that collaboration was “a top-down” idea and an idea connected to PLCs from the “elementary schools up.” It was unclear how and whether technology and PLCs were directly married in the district at large, despite their stated focus in all public documents, every Wednesday.
collaboration days, and Jackson’s superintendent narrative of collaboration connected to technology.

Four out of five superintendents created their own personal PLCs to aid the team as they worked to frame the technology initiative for the school system. This technology learning ecology was described in ways that revealed a PLC framework undergirding the work. In four of the five districts, a group of people with a shared mission and vision that undertook a collective inquiry about how best to implement the technology initiative in the school system (the technology leadership or research/vanguard teams of these districts). These groups in all four systems shared time (formal and informal), worked collaboratively, and communicated regularly about findings, actions and experimentation that occurred while seeking avenues of continuous improvement for the system and the system’s practices around technology implementation.

Except for Norman, all other superintendents and their leadership team members described the creation of a technology leadership PLC in strategic planning for the technology implementation. However, they did not label this group as “a PLC” when asked about collaboration structures operating within the system. Superintendents did not indicate that they required these same conditions to be present for educators across the district to learn to adapt to the technology initiative or implement it in their own work areas. Descriptions of technology professional development and collaborative expectations did not include ensuring that these PLC constructs were replicated for the larger district’s learning.

In all of the study districts, superintendents were less directive or deliberate about creating specific expectations for collaboration or use of existing collaborative/PLC when
they implemented the initiative across their districts. For example, none of the
technology integration specialists staff interviewed (7 of the 23 interviews conducted for
the study—nearly one-third of the interviewees) articulated that they saw
 collaborative/shared time PLC-type structures as the vehicles for technology
implementation in their systems at the building/teacher level, even though the
superintendents and key framers as well as other technology team district leaders did.
The role of these technology integration specialists in the Washington, Adams, Madison
and Monroe systems was to assist teachers in integrating technology into instruction, yet
none cited collaborative planning/shared time structures as opportunities for teacher
teams to deliberately train to do so or work together on this as a PLC. These types of
collaborations did occur but are described as informal professional development
experiences as defined below. In addition, Jefferson had a technology integration
specialist in the district, but she was not cited as key to the initiative by two-thirds of
leadership team members interviewed. Since these individuals are the main link between
the technology leadership team’s framing and the collaborative work with teachers, it is
clear that in all of the PLC constructs have not been leveraged or “scaled up and across”
the system to assist in moving forward the technology implementation or to explicitly
support teacher learning during this innovation’s beginnings in the larger school system.
This disjuncture is explored in greater depth in the discussion section below.

Despite the disjuncture between superintendent action and district-wide scaling of
PLCs, a relationship exists between collaborative constructs like PLCs and the
implementation of large-scale technology initiatives. This relationship is evident within
the collaboration between superintendents and their leadership teams. However, this
relationship between PLCs and technology implementations may not be as evident or clearly defined as districts seek to spread such work to all implementing educators. For all district educators, superintendents instead described professional development as the main tool to support the technology implementation with educators across the districts.

**Technology professional development.** Technology professional development opportunities were described by all five superintendents and by four of the five key initiative framers as the primary mode of district-wide collaboration around technology initiatives. These professional development collaborations were described both in ways that incorporated the PLC constructs defined for this study and those that did not, both of which will be discussed in subsequent sections.

The professional development opportunities that were most often described using PLC constructs were described as research tasks, which included pilots and visits to other school systems or schools who were implementing large-scale technology initiatives, and district-arranged formal professional development sessions, workshops, or graduate classes. Those professional development opportunities that were not linked to PLC constructs an identifiable manner were described as informal professional development that emerged more organically and irregularly within the district.

Research tasks were described as linked to PLC constructs in four of the five districts. Formal professional development opportunities provided in the district were discussed by all districts in ways that linked them to PLC constructs and were especially linked to descriptions of district-provided graduate classes. In the Adams district, a unique use of social media to provide professional development and collaborative time was also linked to PLC constructs by all interviewed from that district. Informal professional development sessions arranged by the district were not discussed in ways that linked them to PLC constructs in any of the districts, rather, if PLC type
collaboration occurred in these sessions related to technology development activities, they were described as accidental or just happening based on what people needed at that time.

**Research.** Research around implementing a large-scale technology initiative in the study systems included many PLC components within a collaborative framework. All five superintendents described research around the implementation of large-scale technology initiatives as important, and, with the exception of the Adams and Monroe school systems, was conducted by the superintendents, even if they were not the key initiative framer in their districts. In Adams, this role was delegated to another district leader—the key initiative framer, Paul; in Monroe, the superintendent joined the district after research had begun and he allowed another district leader—the key initiative framer, Meagan-- to continue to lead it.

As described by superintendents and their leadership teams, research relative to technology implementations has many components within it. **Research**, in the study districts, was described as professional development tasks involving varied district participants including teachers, school committee members, and administrators, the technology leadership team, and the superintendent. Research was a hybrid experience of searching for ideas, models and research about technology implementation through literature and contacts with technology companies, as well as visiting, sharing, piloting technology and planning for the scaling up of initiative to the larger system, grade level, or building. Pilots of this type were co-mentioned and connected with motivational framing in every district except for the Adams system, the system that identified a great deal of discussion about constraints instead of motivational framing and resonance.
Research was the manner in which collaboration and PLC constructs most frequently connected to technology. Research actions broke out into categories described as forming pilots and/or strategic planning teams, taking pilot teams to visit implementing districts, modeling collaborative technology use, and in the Adams district, use of social media/professional learning networks (PLNs). The use of PLNs typically allows individuals to interact with other individuals and does not require those in PLNs to necessarily share a vision, mission, action or a focus on continuous improvement. However, PLNs do employ a collective inquiry, desire for action, shared time and become a collaborative team around a topic—seeking connections and greater amounts of information by using social media sites like Twitter, Ning or blog sites to connect their networks together on a single topic.

The clear majority of PLC constructs discussed in this study were tied to descriptions of these research leadership teams within the system, which were also called “vanguard” or “pilot” teams. These mentions broke out similarly across the school districts with PLC constructs and piloting clearly connected in the transcript data of 15 participants. While the number of co-mentions sketches a possible connection, participant voices describe the actual relationship between research, pilot teams and their connection to PLC collaborative constructs.

---

13 Personal learning network (PLN): A personal learning network is an informal learning network that consists of the people a learner interacts with and derives knowledge from in a personal learning environment. In a PLN, a person makes a connection with others person with the specific intent that some type of learning will occur because of that connection.

14 Twitter is an online social networking and microblogging service that enables users to send and read “tweets”, which are text messages limited to 140 characters.

15 Ning is an online platform for people and organizations to create custom social networks.
**Forming pilots/strategic planning teams.** The act of forming strategic planning and search/research teams was enacted in every study district except for the Adams system. In the Adams system, the key framer of the initiative, the former high school principal, Paul, alone conducted research and formed plans with the superintendent. In all the other districts, teams were formed in order to pilot equipment and conduct strategic planning actions in coordination with the key framer and the superintendent. Interviewees described the pilot groups in ways that used the PLC constructs of *collective inquiry, action orientation, continuous improvement; shared time and collaborative teams*—all of the PLC constructs investigated for this study.

**Taking planning/piloting teams to visit other implementing districts.** Every district in the study took their pilot or strategic planning teams to visit other schools implementing similar large-scale technology initiatives—except for the Adams system. These visits were characterized by the PLC constructs of *action orientation, collective inquiry, shared time and collaborative teams* and served as a means of creating motivational framing around the initiative. Indeed, the Washington, Monroe, Madison, and Jefferson systems all visited extensively in the Adams district to gain insight and inspiration for the technology implementation. In Adams, Paul, the key initiative framer, traveled to visit another state to observe 1:1 device programs in action and brought this back to the district.

Even in Jefferson district interviews, which were largely devoid of discussion of PLC constructs or descriptions of collaborative constructs at the systems level, all
interviewees described their “vanguard team” as a PLC as exemplified by Grace, the key framer’s quote below:

I also created a ‘vanguard’ team of teachers, the more tech savvy group of teachers or volunteers/recruits under 20 people. When we were coming up with how to implement new things; they were my go-to…the vanguard teachers…many took the lead in offering training to other people.

Grace indicated that this group visited the Adams district almost weekly and would come back to discuss what they saw with her and the superintendent. This team served as a PLC collaborative innovation team with a shared mission, vision and values, action orientation, shared time, and a results orientation on the shared inquiry of researching how to lead and implement a large-scale technology implementation in the district. Descriptions of pilot teams like this one existed in every school system save for the Adams system.

Using technology to model technology collaboration. The superintendents in Madison, Jefferson, Adams, and Washington all indicated that they used collaborative technology tools like Twitter (Adams) and Google Applications for Education (Madison, Jefferson, Washington) and Ning (Washington) to model the technology use they wanted to see from teachers related to extending and enhancing collaboration and shared time. This description of time use was included in “collaboration” time in this study because of the manner in which superintendents described its use and role within the technology implementation work. The modeling of technology collaboration was characterized by the PLC constructs of shared time and collaborative teams. In the Madison and Adams districts, Brett and Paul, the key district framers, conducted this modeling. In the other
districts, superintendents conducted this modeling as described by Bob, the Monroe superintendent:

I share routinely through…Google groups a lot of stuff that we put on Google docs…so that in reality, when it comes time for those meetings every other week, a lot of it is already done…almost a flip kind of a thing\(^\text{16}\) with the meetings.

A similar description of modeling technology use was identified by the technology specialists in the Washington district through the use of a “shared technology teacher folder [on their internal network]; the technology allows for collaboration.” Such modeling was not mentioned as a tool by the Monroe district. Jefferson’s implementation key framer, Grace, also used such modeling as a means to directly inspire the high school staff around use of technology for collaborative purposes:

I expanded [the conversations about technology] by doing what was called ‘Wednesday Walk-Throughs,’ where we offered that any teacher could sign up and I’d bring them [sic] to observe [model technology] classes. I prompted them because student engagement or technology integration was something we were looking at. They would pick a focus area…I’d try to show them areas of classrooms where it was definitely happening…I had a “Friday Focus” blog; every week I’d send out something I read…integrat[ing] either student engagement or [technology] integration.

In all districts, key framers and members of the technology leadership teams see use of the technology and modeling of its power to increase collaboration and show new pathways for collaboration.

\(^{16}\) Refers to “flipping the learning,” a manner of pre-preparing content before face-to-face classes or meeting times to increase focus and productivity during face time.
Social media and professional learning networks (PLNs). The Washington and Adam systems both used social media as part of their professional development work. The Washington system used the superintendent’s newsletter/blog to inform staff on best practices and expected technology ideas the superintendent was encouraging in the system. This newsletter was shared with all staff via the internal communication systems and for the superintendent’s community posts on the 1:1 website or posted to the Ning he created for use with his district graduate course.

The Adams system, however, was unique in its extensive use of the social media tool, Twitter, as well as blogs in their technology work. When questioned about their expectations for collaboration relative to their technology implementation, the Adams staff mentioned the fewest number of PLC constructs in their district when compared to other study districts, those that they did, were all connected to collaboration conducted through social media sources and practices. While the superintendent mentioned an expectation for shared time and mandatory teaching team and technology team collaboration to occur, other leadership team members did not corroborate these expectations. In fact, the technology implementation team and the key framer of the initiative indicated that most district collaboration happened through Google Applications or Twitter in the form of social media check-ins about aspects of the initiative, “Google App[lication]s has made our district more collaborative,” and “Twitter, obviously, social media is a big part of what we do in [Adams].” In addition, every member of the technology leadership/implementation team also mentioned Twitter networks and the creation of Personal Learning Networks (PLNs) as the manner in which they deliberately
encouraged collaboration, inquiry, collective action, and a focus on student learning as articulated by the Paul, the Adams High School Principal (key framer):

For me, Twitter is big not just because I’ve learned to much from other people and places and made connections that have helped to move us forward; and it’s selfishly helped us…out on a wider scale because of social media connections…we had a building-wide Twitter chat….It’s just another communication tool and we’ve had teachers that have made neat connections because of it.

The Adams system also collaborated with a popular outside technology professional development training group within which the Adams key framer, Paul, is an instructor. The focus of this training work was a combination of professional development and research. Paul, the Adams key framer, and the superintendent both cited that their use of social media and professional learning networks (PLNs) expanded teachers’ vision of collaboration beyond their team and their school, and to see collaboration as a worldwide web professional development opportunity. Professional learning networks (PLNs) are not typically associated with team learning in the ways described here. They are most commonly associated with social networking and sharing sites like Twitter. However, they allow individuals to reach out to others on specific topics in a virtual format. “Ed Chats” or groups of educators on Twitter join together to discuss topics and gain ideas by tweeting back and forth to each other. They do not share students or an action-orientation, nor do they necessarily share a mission or vision, merely a common topic interest.
Professional learning networks, however, are built around a collective inquiry, and Adams leadership believes this participation to be a collaborative district activity. It is in this spirit that the Adams system employed these wider collaborative networks for the school district. Indeed, all staff meetings at Paul’s school were conducted on Twitter (he eliminated faculty meetings all together in lieu of Twitter chats). Planning meetings in the system were often conducted on Google chats or Google documents “A lot of [the teachers] started using Twitter, but I think they did because it was useful…the second year…I made them stay in their rooms…for a building-wide Twitter chat.” Once promoted to a new district level position, Paul, the Adams key framer/former high school principal, also indicated that he expanded his use of collaborative video Google chats to increase administrative collaboration:

I asked Norman not to pull principals out of their buildings. I feel like to connect with them more often in a quick Google chat once a week…instead of wasting a half hour [traveling]…I say Google is huge. For me, Twitter is big because I have learned so much from other people and places and I have made connections that have helped to move us forward; and it’s selfishly helped us to get our story out on a wider scale because of social media connections.

Also important to the Adams district was the use of blogging to inform the community, document the work done in the technology initiative, and explore ideas brought to them through their research and experiences on Twitter and in their schools, as noted in this response from Jim, the Adams technology integration specialist: “we have a lot of blogs…you can easily go on a principal blog or tech person’s blog or library blog and see 4-5 examples of lessons happening with technology engagement…it’s pretty
much anywhere.” Jim also indicated the meshing of PLC constructs and technology use/exploration occurred through these technology tools: “they’ll have an agenda after a meeting and [teachers] will ask questions and put comments out there…to show how things are going or if something is done or goals were met….they have running conversations.” By cultivating the use of social media, Norman, the Adams superintendent, and Paul, the key district framer, cultivated PLC construct expectations for their educators by connecting them collaboratively in a time-independent manner with a larger, state and “world-wide PLC” focused around effective implementation of the technology in their system.

**Formal district-wide professional days.** Formal professional development was described in all of the districts as professional development days that convened the entire school system. In two districts, the day was also arranged in such a way to allow the district to showcase instructional best practices around which technology was either a main part (Adams) or an important part (Washington). During these sessions, educators in the Adams and Washington districts presented for their internal staff (staffers presenting to other staffers) and also presented for other visiting school systems on how they used technology in the classroom, how they took advantage of the large-scale technology initiative expectations, and trained staff on how to use specific tools. The Adams system focused on use of technology for content curation (creating textbook alternatives) in their “Edcamps and Playdate” workshops\(^{17}\), and the Washington system

---

\(^{17}\) Edcamps and technology Playdates are workshops where attendees sign up for personalized workshops on key technology areas and then are able to spend a period of time “playing” with their new learning in supported learning lab environments. Built on principles of connected and participatory learning, Edcamp attendees lead sessions based on who shows up to the workshop with an expectation that the
focused on how technology use in Washington is a part of a set of tools used to produce high quality instruction.

The Monroe system had the largest number of regular formal professional development days (one per week plus additional days dispersed throughout the year like that of the other districts), and the district technology implementation leaders indicated that these days were called “Technology Share Days,” making the time specifically connected to technology use and training as indicated in the district’s technology goal to “increasingly employ instructional technology for the purpose of improving student proficiency with core content knowledge and skills, while building technology-related competencies,” (Monroe district strategic goals document).

The Madison system had a formal professional development committee that was guided exclusively by the teacher union contract. The teachers’ union selected the teachers who participate in the group and, according to Teagan, the Director of Academics, “it is way too narrow a role…I wish it was a committee that could drive that themselves.” Her discussion indicated that because there was representation from all departments and schools, the committee had the potential to act as a support to the district-wide technology implementation; she had talked to the superintendent about trying to change the scope of the group’s work. In its current form, however, this group could not work as a PLC or even a venue for true collaboration due to the union regulation pressure on the group. Madison also had a formal administrative policy at the central office level that if people went out of district to attend professional development, people in the room will work together to build understanding by sharing their own knowledge and questions.
small groups of teachers from the visiting team were then required to come back and present to other staff and levels within the district, culminating in formal evaluation by attendees. According to Teagan, the Director of Academics, these presentations were, very well received because…I do online professional development feedback forms…so we get feedback right away from when they give a workshop…the key, I think, is colleague to colleague. You know they value that more. You can have someone come in here that really knows their stuff telling them blah blah blah, but if their colleague is doing it, they are going to buy into it a lot.

These groups acted as ad-hoc PLCs in that they briefly shared time, collaboration, collective inquiry, action orientation, and a focus on results. However, the results relative to student learning were not described as tightly managed by the district or coordinated across the system. These workshops coupled with the district’s “Distance Learning Center,” theoretically and formally set up collaboration to continue across the system after the workshops ended.

**Graduate course offerings linking collaboration and technology.** One variation on collaboration and use of PLCs existed in the Washington and Madison school districts relative to PLC use in technology implementation. The Washington and Madison superintendents, Brody and Bob, worked to sustain graduate level courses within which district-wide PLCs were, in essence, created.

Each year, Brody, the Washington school system’s superintendent, teaches a yearlong graduate class requiring teacher teams that work together within buildings to work together to integrate technology into instructional practice. As a reward for doing so, Brody gives participating teams a cart of laptops or iPads for use in their classrooms.
At the time of the study, approximately 30% (approximately 90 teachers) of the teaching staff in the district had taken the course. This formal collaborative expectation was in its third year of implementation (created as professional development to ready the system for the technology implementation) and there was a waiting list for participants—potentially indicating an acceptance or framing resonance created around this course relative to technology implementation.

At the inception of the Madison technology initiative several years ago, Brett, the Madison school system’s key framer and then technology director, created a collaboration with a local college in order for staff to gain graduate credits that added up to a Master’s degree in technology integration. These courses were taken at the school site in a special room built in the new high school. Many staff took advantage of this opportunity and all Madison interviewees cited it as a motivational framing action characterized by *shared time, collaborative teams, a collective inquiry and Action/experimentation orientation* to the technology initiative.

The graduate courses in both districts were cited as formal professional development experiences provided by the school system by all interviewees. The graduate groups shared time and worked collaboratively with an action orientation and collective inquiry into how technology could impact learning. While the district’s PLC structures or collaborative venues were not directly pointed toward integrating technology and instruction, these other structures were instead created and offered to all staff on a voluntary basis. In all systems, staff responded to the offerings in large numbers although only the Washington district could indicate number of staff. All interviewees in Washington and Madison cited these courses as important to the
acceptance of the initiative. In fact, when comparing framing constructs with PLC implementation constructs in analysis of interview transcripts, descriptions of these courses were areas of identified district “resonance” around technology use, i.e. a moment in time where the technology initiative started to make sense relative to learning for participants (connection to learning).

The Adams system also provided formal professional development prior to the start of the school year by employing an outside technology professional development provider to present to staff. This was not described in PLC terms and no interviewee discussed these sessions as part of a motivational frame; although one interviewee, the technology integration specialist, Jim, indicated that some teachers felt the sessions were places where they could connect the technology to learning through collaboration. Jim described these kinds of experiences as moments of “resonance” – or times when the staff could connect the technology to learning and therein accept or embrace the initiative’s role in the district. All interviewees characterized this as “formal” professional development time, but the links to the PLC label or PLC constructs were not made and the groups did not appear to meet after the appointed summer workshop days.

**Informal professional development workshops.** Informal professional development workshops were described in various ways and were provided with regularity in every district (see Table 9). However, these informal experiences were not described using PLC constructs by any of the interviewees in any of the districts. The Adams system had technology integration staff who held weekly drop-in learning sessions called “How do I do that?” sessions, allowing teachers to stop by and ask whatever questions they might have about learning a new technology.
Washington educators described sessions provided by the technology integration specialists that allowed departments and teams of teachers to come together during shared time, but to do so without a formal presentation or as a result of “in-the-moment” requests as described by Georgia, one of Washington’s technology integration specialists: “I have been involved in a lot of collaborations [with teachers] and I am sure tech is a part of their conversation or regular collaboration. I do get questions about technology afterwards [after teachers meet in collaborative meetings].” The technology specialists are not deliberately included advance planning in the collaboration, and technology is not seen as part of the required or expected informal and independent work of teacher teams.

When a partial set of PLC constructs was mentioned in the interviews, and the interviewer probed for descriptions of the work, the technology integration specialists in these systems indicated that these were “organic” happenings or moments like these described by Jim, the Adams technology integration specialist:

We are scheduled into preps\(^{18}\) or not…on a group basis…you can go to the library at any time to meet with someone…from our ed-tech team….or just sit in a room and work with other teachers on how to use something or even if they want to just talk about new evaluation systems because it’s not all technology driven. But the [collaborative time] is in place to provide that time, and it is optional. You come in to work with other teachers…If, say, they need to learn to use Air Server on their laptop, we show them how to do it. That’s the time they have set aside if they want to meet other teachers. Maybe a 3\(^{\text{rd}}\) grade teacher at [elementary

---

\(^{18}\) “Preps” are blocks in teachers’ schedules where they do not have teaching time with students. They prepare for lessons, grade papers and may collaborative with others depending on district expectations and teacher contract provisions.
school] wants to meet with another 3rd grade teacher from another school—maybe build a lesson together. We have built some nice collaborative projects based on that optimal PD time. Once a month we do a “free range” someone has indicated they want to learn a specific tool and we give them a topic session.

The collaborative projects cannot be scheduled and emerge depending on who attends the support sessions together. “Free range” sessions were described as staff dropping in and asking for potentially any topic related to technology use. “Topic” sessions were described as those the technology staff prepared formal presentations for and published it at large to staff.

The Madison system created a “Distance Learning Center” in the high school they built early on in the technology initiative. Reducing the isolation caused the by the geographic locations of their elementary schools was identified as one reason for the center’s creation. In this rural and geographically sprawling district, coordinated time for grade levels across the two elementary schools was a barrier to collaboration and PLC work. Meetings were held there to bring the schools together through online professional development and webcasts given in support of a grade 4 and 5 collaborative project across the schools. This interdisciplinary project/center started as a formal goal of the system but was executed in an informal manner in practical execution. The use of the center and the type of collaborative projects created there were designed to increase student learning, engagement and links to careers. The grant writer for this district indicated that she wrote several grants to support collaborative curriculum projects on topics like “aviation across the disciplines.” Teachers in the elementary schools then worked around these topics to provide projects for students. The expectations for these
projects were loose and driven by teacher inquiry and interest. Neither the central office
technology implementation team, nor the superintendent created formal training or
expectations.

Finally, the Jefferson system did not mention that they conducted ongoing
technology training at the system or high school building level, but Grace, the key framer
and high school assistant principal in charge of leading the implementation, arranged
what they did conduct. This professional development mostly occurred in monthly
collaborative sessions held at the high school after school. David, the Jefferson
superintendent, did not mention the topic of these sessions in great detail; he indicated
that the assistant principal had arranged regular job-embedded “workshop time for
teachers to learn to use the technology.” Grace indicated that she focused once per month
collaborative meetings on technology when she could; she also sent out memos with links
and resources related to technology implementation to the staff.

Across the five study school systems, these informal professional development
experiences were, at times, described as “spontaneous” or “drop-in” by Jim and Howard
from Adams, Rylan, Ava, Caitlin, and Georgia from Washington, and Grace in Jefferson
and did not identify a connection to longer-term or ongoing collective inquiry and action
orientation associated with the PLC structure. No descriptions of informal professional
development included discussion of shared mission or goals related to student learning or
a common vision for instruction using technology, rather, they were largely described as
sessions where teachers could ask questions and remove barriers in their technology skills
or were places where teachers teaching in an isolated fashion might bump into the work
of others and thereby make connections and collaborations.
While informal professional development was not strongly linked to the collaborative work typically done in PLCs, each interviewee in all five districts mentioned some informal professional development as part of the technology initiative critical to developing the initiative. So while informal development does not link strongly to PLCs, it was still identified as a part of moving the technology initiative forward in the district.

This study demonstrates that the value of PLCs lies in helping those charged with bringing change and innovation to the system to understand the change and move it forward in the system. Like the learning medium described in Zhao & Frank (2003), PLCs help to create a “learning ecology” that nourishes development of the work in the system. While PLCs may have a relationship to acceptance or to maximizing the initiative in the systems, they may not be necessary to gain initial acceptance for technology initiatives. This study indicates that PLCs do have a relationship to motivating staff and leaders within the district and for minimizing the effect of district constraints that threaten to hamper or slow the diffusion of technology implementation. The discussion section below explores the ideas revealed by these findings and seeks to make sense of them for future practice.

**Discussion**

In this study, superintendents revealed how they encouraged and expected collaboration from educators across their school systems and leveraged professional learning community (PLC) constructs in their collaboration with technology implementation leadership teams. Such modeling and use of PLC constructs were not, however, scaled up for use across the entire district. Discussion includes theoretical and
practical contributions; challenges in scaling PLCs, and limitations to this study’s findings are also discussed.

**Theoretical Contributions**

While each district framed their technology implementations in slightly different ways, all of the study districts used their technology leadership and implementation teams as PLCs that included the key framer of the initiative and the superintendent as members. Whether the key framer was the superintendent or not, all superintendents described the technology leadership team actions using PLC constructs, identified the technology implementation/leadership team as critical to the initiative, and their learning and research processes as critical to gaining acceptance in the district. Therefore, a useful contribution to frame theory relative to technology implementations in schools suggests a mix of leadership actions that can help a district promote technology implementation and withstand the risks of an innovation like large-scale technology implementation. Figure 5 proposes a theory for creating a technology learning ecology to help leaders frame and gain acceptance of large-scale technology initiatives.

![Figure 5](image)

**Figure 5.** Theory of PLC relationship to gaining acceptance for large-scale technology initiatives.

As described in this study, use of technology team PLCs and motivational framing by the superintendent or key initiative framer allows for increased resonance around the
implementation, which may assist in gaining acceptance for large scale technology initiatives in school districts.

This study revealed that acceptance for technology implementations can be gained with or without the use or leveraging of collaborative constructs like PLCs and with or without specific types of framing. However, certain ways of framing technology initiatives capitalized on the existence of PLC structures in work with educators. This study indicates that with the exception of the Madison district, diagnostic framing was largely absent from the study district’s technology implementations; framing a learning problem to solve with technology was not necessary to gain acceptance for a technology implementation in a district. This finding has bearing on the use of PLCs in the technology implementation. Without the framing of a learning problem or instructional goal (Flanagan, 2014) around which to center the technology implementation, it is harder to execute PLCs or implement aspects of PLCs that allow groups of educators to connect the technology to student learning and sustain educator work around the initiative. Frame theory suggests that the sustaining of resonance in the movement is critical to the diffusion of the frame through the constituencies of the movement. Resonance, it should be recalled, are moments when "frames motivate or cause [a] shift [in] beliefs" (Park, Daly and Guerrera, 2013, p. 4). This study, in keeping with professional learning community literature, indicates that the initiative may be less robust or diffuse without PLC groups to make the proposed innovations in curriculum, instruction, and teaching described by the five district superintendents, a reality.

However, whether or not a learning problem and diagnostic frame were identified in technology implementing districts, prognostic frames, plans, and goals for
implementation were identified. To operationalize these plans, superintendents applied motivational framing actions more heavily than other frames. The larger study data (Arnold et al., 2014) when combined with analysis for my study indicates that PLCs were also discussed when motivational framing was exercised. Discussions of motivational framing and descriptions of PLC collaborative constructs also overlapped more frequently with times when participants described resonance within the initiative.

Motivational framing was common across study districts, and PLCs and motivational framing was linked to participants’ descriptions of resonance. Similarly, where constraints were identified, PLC descriptions were described less often or not at all (recall Figure 4). Collaborative constructs like PLCs, therefore, may, have a relationship to perceptions of resonance and constraints in implementing the technology initiatives.

Alternate explanations for the manner of PLC use by superintendents in this study can also be discussed. A possible explanation for the superintendents’ limited deliberate use of PLC constructs for technology implementation learning is that superintendents do not finely focus or clearly message their vision for technology relative to teaching and learning (Flangan, 2014) across their districts, contributing to less collaborative unity on the topic. Alternatively, superintendents may focus most directly on technology infrastructure and financial planning (Arnold, 2014), seeking instead to use PLCs for their own learning while distributing the actual scaling up of the initiative to the key framers in their systems (Turner, 2014).

Finally, possible alternative explanation of superintendent use of collaboration connected to the technology implementation is that whatever PLC structures existed in the various systems were actually strengthened by the implementation
itself. Superintendents/technology team leaders may indicate that the level of collaboration and evidence of other PLC constructs such as collective inquiry or action orientation may be enhanced and galvanized by the implementation, corroborating prior research around technology and professional learning community (Dexter, Seashore & Anderson, 2002). The technology initiative and the PLC may be mutually enhanced by the presence of the other. This also suggests, however, that PLCs may be weak or virtually nonexistent in districts and may actually “present predictable, established practices,” (Van Lare & Brazer, 2013) and only temporarily come together because of the innovation that must be made to conform with the established practice. In order to develop a more robust theory of the impact of PLCs on technology implementation a correlational study would need to be conducted assessing both the level of PLC implementation and of technology integration. Such limitations and areas for future research are discussed in a future section.

**Contribution to Practical Knowledge**

Technology initiatives can be implemented and accepted with or without PLC structures in place in a school system. However, the pattern of linkage between PLC constructs and technology implementation framing indicate that PLC structures may help create more motivational frames for the initiative and thereby support moments of resonance relative to the initiative. The more moments of resonance in a movement, the more the movement gains momentum, (Benford & Snow, 2000). Relative to this study, the more moments of resonance, the more potential buy-in or positive feelings that the technology initiative is connected to student learning.
Whether through technology implementation research teams, actual job-embedded PLCs, short-time projects, or collaborations designed to support technology implementation in the district, all districts described using some aspect of PLCs collaborative constructs to support and move forward the initiative. While not explicitly stated, the Adams experience with social media and personal learning networks (PLNs) may also illuminate a new pathway for creating the powerful support of PLCs while using the opportunity of a technology initiative to connect educators with global collaborations and resources. These descriptions of PLC use in technology implementation generate the following recommendations for district leaders contemplating large-scale technology implementations.

**Grow PLCs through choice, incentive and professional development.** More moments of resonance and more mentions of PLC constructs occurred in the graduate courses created in the Washington and Madison school systems and in the graduate program for educators created in the Madison system than in any other setting or structure described in the study districts. These research and study groups were not existing or labeled as PLC groups within the system, but were professional development groups created to support the technology implementation. These groups, however, functioned as PLCs in the system—incorporating all of the PLC constructs into the manner in which they conducted classes and learning opportunities. Both school systems designed the courses with an inquiry (*collective inquiry*) stance, required staff to create projects for use in the system (*action orientation*) out of the coursework and created an innovation (*experimentation*) and sharing network (collaboration/shared time) across the system. Finally, staff members were required to share their learning and its impact on
classroom practices and student learning (*results orientation*). It appears that the formal
arrangement and nature of the courses had a notable and consistent effect on staff
participation in the technology initiative.

**Create small innovation/implementation teams across the school system.**
practical recommendation for school leaders considering large-scale technology
implementations is to set up innovation teams across the system. These teams can sustain
the implementation, move forward the key framer’s vision, and interact with and feed the
learning of the superintendent, leadership team and other staff. Such environments
should enable innovation, adult intention and autonomy, allow for fluctuation, creativity
and chaos, redundancy and variety in adult learning and growing. This recommendation
is supported by research concerning technology businesses seeking greater effectiveness
and integration of new knowledge in teams (Eisenhardt & Zbaracki, 1992; Nonanka,

Prior research on strategic decision-making and knowledge creating companies
indicates that it is possible that this sustaining and nourishing structure creates a
technology learning ecology. Such a learning ecology provides the support for
superintendent framing actions; in turn, the superintendent’s learning and collaboration
helps to motivate constituencies to gain acceptance for technology implementations.
Creating structures that employ PLC constructs allows for the creation of such ecologies.
As noted in Spillane, Reiser and Reinter’s, (2002) study of policy implementation,
framing and cognition, such informal communities provide a social context that affects
sensemaking in implementation and that “sensemaking is distributed in the interactive
web of administrators, teachers, students and their situation,” (p. 412). While the
superintendent and leadership teams in this study created these teams to assist in their own learning and implementation task, scaling these groups up across the implementing district would create many other disciples of the technology vision who could then frame and reframe the vision across the system, creating more buy-in around the technology initiative.

**Combine PLCs with research, risk-taking and support.** Similarly, leadership is required from teachers as they adopt and use technology; thus, they may need the PLC structure to withstand the risk-taking. Professional learning communities can support leaders as they frame large-scale technology initiatives, and educators as they accept the initiatives. Research/trial or implementation pilot groups may act as PLCs and help school system staff withstand the innovation of large-scale technology implementations as places for “fusing…technology with face-to-face collaborative knowledge exchange to generate new products and/or services,” just as innovative businesses do (Nonaka & Takeuchi, 1995, p. 147). Using PLC approaches or systems to implement technology initiatives may lead to the perception of fewer constraints around the initiative, thereby allowing for motivational framing to inspire more staff to embrace the initiative.

This type of collaborative work and “search” activity is in keeping with current research on PLC impact and implementation in school systems (Talbert, 2009) which indicated “knowledge resources for research and professional practice outside the system are essential to PLC learning and improvement,” (p. 565) and prior research which indicates that organizational learning involves two roads to learning:

- search for information outside of the organization and the use or the incorporation of that information (or the deliberate decision not to
incorporate that information) into rules regarding the behavior of
individual organization members and the organization as a collective.

(Honig, 2006, p. 128)

Superintendents and leadership teams serve as “boundary spanners” leaving the district boundaries to search out new practices, and engage in “boundary practices”—regular forums for mutual engagement to sustain connections across new implementations (Coburn & Stein, 2006). Professional learning communities (PLCs) emerge from this study as potentially powerful tools to aid leaders in implementing the inevitable large-scale technology implementations that will face all school systems in the near future.

**Limitations**

This study’s limited sample size, and limited sample selection impact generalizability. The use of only five small to mid-sized districts of Level 1 or 2 achievement status limits wider application of this study’s results and begs for study of an urban system to assess the impact of PLCs and scalability of such a model for support of technology implementation. In addition, because the cases for this study were chosen because they had already successfully gained acceptance for the technology initiative in their systems, findings are not definitive surrounding the relationship PLCs can have in a technology implementation.

This study is also limited in that it describes collaboration primarily from the superintendent’s perspective and does not describe the role of collaboration in the technology initiative from classroom teacher perspective or cross check if the collaboration mattered to how other constituencies perceived the initiative and gaining acceptance. The snowball sampling method focused at the leadership level ensured a
more narrow narrative experience and description. While there was similarity in how interviewees from the same district described some aspects of the initiative, there were differences in some perspectives, which are detailed below.

At times in the study, superintendents had different ideas about collaboration than some of the interviewees, such as technology integration specialists, whose roles were closer to classroom practice. This disjuncture occurred when superintendents generalized about the district-wide level of collaboration based on observing the work of the team closest to him (his leadership team) and then assumed because he envisioned technology collaboration occurring that it did. The descriptions of collaboration offered by the technology integration specialists in Adams and Washington and the Jefferson Assistant Principal, Grace, indicated that these collaborations were not as uniform or predictable as indicated by the superintendent. This may have been due to how much collaboration the superintendent actually observed or his perhaps mistaken belief that because he said collaboration should occur or set time aside for it that it actually happened consistently in the district. Future studies should include the voices of additional constituencies in the districts such as teachers, community members, school committee members and town meeting members to determine how collaboration played out in all aspects of the system’s implementation.

An additional limitation for this PLC study existed in that many of the technical staff, such as the technology directors in Adams and Washington, could not describe anything about the level of collaboration or PLCs in the district. These individuals were only seen and used as technical resources in the system and were not included in
meetings about professional development design or educator learning systems, further limiting the sample size and the usefulness of their interviews to this PLC study.

In the Monroe district, Jackson, the superintendent, continually made statements that he was “not involved in the creation or gaining acceptance of the large-scale technology initiative in his system.” He also largely deferred to Meagan, the technology director, as the true leader of the initiative. However, he and the technology director described actions he took that both indicated use of PLCs and a PLC orientation to using the technology within a PLC learning ecology, and he took several actions to financially sustain the initiative through creative financing. This area was hard to make sense of as his discussion was laden with knowledgeable descriptions about PLC constructs and framing, but he continually claimed non-participation or a lack of deliberateness or connectedness in linking the technology initiative to his instructional vision.

The Adams system’s use of PLNs (Personal Learning Networks) demands further study of these networks as collaborative vehicles. Further study could indicate the impact of such networks on technology implementation and whether or not they are more effective than traditional collaborative models like PLCs for supporting implementation and gaining acceptance.

Finally, this study did not measure the level of PLC implementation in systems prior to technology implementation. Therefore, possible alternate explanation relative to the manner of PLC use by superintendents could be made that contrasts with analyses above, thereby revealing other potential limits to the generalizability of this study. A possible phenomenon at play during the technology implementation in these districts is that whatever PLC structures existed in the various systems were
actually strengthened by the implementation of a large-scale technology implementation. In other words, superintendents/technology team leaders may indicate that the act of sharing time and collaboration through collective action around the technology implementation may in and of itself strengthen the implementation of PLC constructs in a system. This scenario can suggest that the technology initiative and the PLC are mutually enhanced by the presence of the other. This also suggests, however, that PLCs may be weak or virtually nonexistent in districts and may actually “present predictable, established practices,” (Van Lare & Brazer, 2013) and only temporarily come together because of the innovation (in this case the technology implementation) that must be made to conform with the established practice. In order to know more definitively the impact of PLCs on technology implementation, a correlational study would need to be conducted and an assessment of the level of PLC implementation and of the level of technology integration would need to be assessed. A variant on this would be to one collaborative construct from the PLC framework in a deeper fashion relative to large-scale technology implementations. Despite these limitations, this study suggests that professional learning community collaborative structures already in existence in districts should be employed as part of technology implementations. Collaboration models like PLCs can be employed to provide support and sustainability structures for technology integration thereby creating a technology learning ecology to nourish acceptance of large-scale technology implementations in school systems.
Chapter Six

Discussion

Introduction

This chapter will summarize the key findings of this study and discuss the potential contributions of this study for practice and theory. The discussion will outline limitations of the study and the implications for future research. Finally, the research team will make recommendations from the results for superintendents pursuing large-scale technology initiatives in their districts.

Summary of Key Findings

The findings of this multiple-case study describe the many actions superintendents took to gain acceptance for technology initiatives in their districts. In addressing this research, the team assumed that superintendents are no longer asking whether it makes sense to move toward a 1:1 learning environment, but rather when and, most urgently, how. The study results provide assistance to district leaders as they work toward framing the implementation of a technology initiative. Additionally, this study begins to fill the current gap in the literature on superintendents as technology leaders by detailing how the five districts in the study gained acceptance for the technology initiatives in their districts.

Three central findings resulted from this study. The first finding was that superintendents achieved resonance through leadership actions that were consistent with

\[19\] This chapter was jointly written by the authors listed and reflects the team approach of this project: Peter D. Cohen with Erik P. Arnold, Gina E. Flanagan, Anna P. Nolin, Henry J. Turner
prognostic and motivational framing. Achieving resonance is a sign of the effectiveness of the framing actions of the superintendents and all superintendents were able to gain acceptance for their initiatives.

The second finding was that superintendents considered constraints the initiative might face. These constraints were (a) financial, (b) political, (c) competing interests, and (d) technology support staffing. Understanding these constraints allowed superintendents to develop a structured plan for the technology initiative that took these constraints into account.

The third finding was that superintendents developed strategic processes to gain acceptance for the initiative. These processes were undertaken to either prepare for implementation or to create buy-in. The strategic processes that superintendents took to prepare for implementation were: conduct research, select equipment, identify key players, pilot devices, conduct professional development, and assess the capacity of the technology staff. The strategic processes that superintendents took to create buy-in were: communicate expectations for use and public relations efforts. Taken together, effective action by the superintendent in these areas helped to gain acceptance for the initiative.

Summary of Thematic Studies

The research team also conducted five thematic studies that address how superintendents utilized distributed leadership (Turner, 2014), instructional vision (Flanagan, 2014), professional learning communities (Nolin, 2014), technology decision-making (Arnold, 2014), and the superintendent’s use and attitudes regarding technology (Cohen, 2014). This section summarizes the findings of each of these studies.
**Distributed leadership.** Turner (2014) studied distributed leadership and its role in the acceptance of technology initiatives. While there were different methods of interaction in all districts, leadership was distributed in each district and required more than one person to gain acceptance of the initiative. With the exception of the superintendent of Washington, Brody, the superintendents relied on one person more regularly than the other members of the technology team to help gain acceptance of the initiative. This leader is referred to as the primary leader. While the superintendents identified one individual as the primary leader, there were additional individuals who played direct leadership roles in gaining acceptance of the initiative. Often the secondary leaders worked alongside the primary leader to gain acceptance of the initiative. Study results found that superintendents worked with a primary leader as well as secondary leaders to gain acceptance.

Superintendents worked with these leaders to discuss logistics and ensure effective communication with the stakeholders, be they parents, school committee members, or faculty. Superintendents typically interacted with primary and secondary leaders through institutional practices, such as meetings where they worked through explicit tasks.

**Instructional vision.** Flanagan (2014) studied the development of an instructional vision and how that process can help superintendents gain acceptance for a technology initiative. Our results indicated that the instructional vision of superintendents who have participated in a large-scale technology initiative is often connected to constructivist/21st century learning components such as: communication,
collaboration, creativity, student engagement, real world applications, and technology use.

In most of the districts who participated in this study, the superintendent’s instructional vision was not consistently re-iterated or emphasized in the district’s mission statement, technology plan or by district administrators. The development of the instructional vision in a large-scale technology district, did not involve all the district administrators who were identified as key players of the technology initiative (primarily technology support staff). In terms of how the superintendent connected his instructional vision with the technology initiative to all stakeholders, the superintendents utilized motivational and prognostic framing which helped to create acceptance for the technology initiative.

The articulation of the instructional vision in connection with the technology initiative by district administrators was inconsistent in each district. In many districts, the instructional vision was often defined as the technology initiative. The implementation and communication of the instructional vision in these districts, specifically as it pertained to the technology initiative, was often described as much more collaborative, involving all stakeholders. In terms of how district administrators made sense of the superintendent’s instructional vision for technology, district administrators felt that the superintendent’s leadership in defining and supporting the instructional vision for the initiative was very helpful in gaining acceptance. However, in this study, although most district administrators were inconsistent in their communication and understanding of the superintendent’s articulated instructional vision, they seemed to understand and accept technology’s place in the classroom.
**Professional learning communities.** Nolin (2014) studied professional learning communities and their role in the acceptance of large-scale technology initiatives. The findings confirm that PLCs, their constructs and collaborative structures in districts do serve to assist in the implementation of large-scale technology implementations in school systems, but largely at the central office strategic planning level. Superintendents created their own technology learning ecologies that functioned as PLCs for technology implementation teams, but did not necessarily “scale up” PLCs for district-wide technology learning.

Superintendents clearly expect collaboration and shared time to occur across the school systems with regards to implementing the technology initiatives, but varied in the degree to which they connected PLC constructs to support the technology initiative.

The term PLCs was not used as a part of the superintendent’s deliberate strategy to support technology implementation or gain acceptance. However, all five superintendents described expectations for *shared time, collaborative teams, an action orientation* and expectations for *continuous improvement* in their descriptions of educator work involving the technology implementation in their districts.

**Infrastructure.** Arnold (2014) studied the factors considered by superintendents in making decisions about technology infrastructure. The study results found that superintendents valued the capabilities and reliability of a device and were willing to pay more (within budget) for a device that had these qualities. A device (laptop or tablet) was considered reliable if it worked well for three to four years. Superintendents knew these devices would be transported to and from school daily and they wanted some assurance that the device could withstand this type of handling. Ease of use, long battery life,
multi-media recording, and compatibility with existing district technology were the device capabilities most frequently mentioned by superintendents and technology leadership team members. The other factor that was considered by superintendents was the price of the device. This did not mean, however, that they chose the least expensive device; in fact, no superintendent did this. Instead, superintendents discussed the value they thought they were getting by purchasing a device that may have cost more, but offered the capabilities and reliability that they were looking for.

The next two findings concern the factors that superintendents consider when they are making decisions about how to fund a technology initiative. One finding is that superintendents funded 1:1 initiatives by seizing one-time budget opportunities and through creative financial moves. Technology funds that were available due to a state-subsidized school building or renovation project helped fund four of the five technology initiatives. The one exception to this was the Adams School District. They were able to fund their 1:1 iPad initiative through a combination of creative financial moves that included: transferring annual network infrastructure costs from the school budget to the town budget, staff reductions, and cost savings in other areas of the high school budget. The third finding is that superintendents considered the financial sustainability of the technology initiative before committing to it. Each superintendent chose a large-scale technology initiative that they felt was financially sustainable. For example, Washington chose a BYOD program, Madison went with a Blended model, and Monroe chose a 1:1 laptop program. Each of these initiatives had very different costs associated with them, but each superintendent indicated they were sustainable given their respective school district budgets.
In seeking to find if the infrastructure decisions had an impact on acceptance of the initiative, we found that in order to gain acceptance by teachers for 1:1 initiatives, robust and reliable Wi-Fi networks were identified as being critical. Technology leadership team members in each district indicated that if teachers considered the network unreliable, they would be less likely to integrate the technology into their lessons.

Superintendent’s use and attitudes regarding technology. Cohen (2014) described how superintendents and other district leaders use technology in their practice as well as exploring the leaders’ attitudes about technology. All of the superintendents in this study and all other district leaders involved in the technology initiatives used technology in their everyday practice. The leaders in this study describe using technology for two main purposes in their professional practice: communication and collaboration. While the data indicates that nearly all superintendents and district leaders are using technology for communication, the data are inconclusive about any connection between the superintendent’s use of technology and gaining acceptance for a technology initiative.

While the use of technology by superintendents and other district leaders is variable, the overall attitudes about technology amongst the five superintendents indicated commonalities. First, the superintendents and other district leaders indicated that technology was an important tool for instruction. Second, leaders in each district discussed the helpfulness of technology in preparing students for college and careers. Third, there was also an indication that superintendents wanted their districts to be on the cutting edge as innovative school districts, not behind the curve, but proactively inserting the tools students will need in the future.
Every superintendent we interviewed was pleased that his district had moved toward deeper involvement with technology in the classroom. This attitude appears to have more of an impact on the acceptance of the technology initiative than the superintendent’s use of technology. In other words, while there is no direct correlation between the uses of technology by superintendents, the superintendent’s attitude about technology is a strong factor in gaining acceptance for the technology initiative. Ultimately it is the superintendent who needs to make the case for the funding and sustainability of the initiative.

Discussion of Findings

This section will highlight the contributions this study makes to theory and practice as well as the relevance of this study to the literature.

Theoretical Contributions

Frame theory identifies three core steps to framing that include diagnostic framing which identifies a problem; prognostic framing, which identifies a solution to the problem; and motivational framing, which creates a call to action through communication to solve the problem (Benford & Snow, 2000). The study results add to the complex dynamic of framing social movements. The framing process is not linear when applied to gaining acceptance for technology initiatives in schools. The study results indicate that it is not even necessary to gain acceptance for a technology initiative by first identifying a problem. In the district of Adams, for example, Paul, who was the high school principal as well as the primary leader of the technology initiative, made the case to Norman, the superintendent, that every student in the high school needed a mobile device. Paul did
not first identify a problem rather he made the case for the goal of integrating more
technology into his school.

Elements of frame theory were present in each of the five districts researched for
this study. More specifically, motivational and prognostic framing and the utilization of
strategic actions to build resonance (Benford & Snow, 2000) were in place as
superintendents worked to gain acceptance for the technology initiatives. The study
results highlight the importance of effective communication when seeking to gain
acceptance. Superintendents in this study needed to convince all key stakeholders –
teachers, parents, and community – in order to create resonance by making the case for
the importance of the technology initiative.

This study makes an important contribution to frame theory by highlighting the
mix of leadership actions and effective communication that can help a superintendent
gain acceptance for a technology initiative. Additionally, the data of this study indicate
that motivational framing can help leaders successfully create resonance for an initiative
and overcome constraints.

**Lack of Diagnostic Frame.** Only Bob, the Superintendent from the Madison
School District looked at that district’s technology initiative through the lens of
diagnostic framing. He saw the majority of his rural student population without
computers at home and without Internet access. Of note is that numerous studies have
actually shown robust home computer and Internet access amongst low-income students
in this rural area of the state. Bob’s personal view for the students in his district was that
access was a problem. According to Bob, getting the students in Madison a computer
was not enough: “the reality of how you’re going to get high speed internet to, you know,
roughly less than ten thousand people over two hundred and five square miles is pretty difficult.” The Madison superintendent identified a problem and put a plan in place to solve that problem. The superintendents in Adams, Jefferson, and Monroe did not identify a problem that they saw technology as the solution, rather, as the Jefferson superintendent indicated, “It was less about solving a current problem, it was more about the future and giving us a fighting chance to be ahead of the curve for once.” This leads us to consider if it is even necessary for there to be an educational problem for which a technology initiative is seen as the solution. Could it be that increasing student access to technology through a 1:1 initiative is seen as an educational innovation that does not require diagnostic framing? In hindsight, however, the superintendents in Washington, Adams, Jefferson, and Monroe identified the lack of 1:1 technology in the hands of students as a problem. The problem was access to technology either because students did not have technology at home, as in Madison, or because demand for using technology in school outpaced supply of computer labs and carts of laptops. While nearly all of the districts skipped over the step of assigning blame as identified as part of diagnostic framing, they did seek to remedy the issue of access to technology.

**Resonance.** Frame theory tells us that the goal of resonance is reached when the framing actions of a leader sway the beliefs of others thus creating movement for an initiative. In this study, resonance meant that the superintendent evoked a connection or shared feeling that the technology initiative was important for the district. Our findings indicate that the superintendents in this study sought resonance through their leadership actions. However, in some cases, it took the primary leader of the initiative to first achieve resonance with the superintendent before the initiative could move forward.
Resonance is essential to gain acceptance. Figure 6 indicates that the effective countering of constraints by strategic processes leads to resonance. The leadership actions of superintendents and other district leaders were a function of their efforts to solve a problem – prognostic framing, and initiate a call to action – motivational framing. These actions work to overcome any constraints that an initiative may face and eventually lead to resonance. The study results indicate that resonance then builds acceptance.

![Diagram](image)

*Figure 6. Strategic processes are a function of prognostic and motivational framing and they work to counter constraints. If successful, this leads to resonance. Adapted from, “Framing Processes and Social Movements: An Overview and Assessment,” by R. D. Benford and D. A. Snow, 2000, Annual Review of Sociology, 611-639.*

Our study reinforces this idea and indicates that it may be that resonance is achieved in small ways and ripples out to others. Having the superintendent frame the initiative seems to be an essential step in achieving resonance. Benford & Snow (2000) teach us that the more resonance moments that occur in a movement, the more likely it is for a
movement to gain momentum. Resonance leads to a higher rate of buy-in amongst key stakeholders. In our study the district leaders were able to take the necessary steps in their specific situations to connect the technology initiative to student learning and create positive support for technology in the hands of students.

At the commencement of this study, we were unaware of any published research on the role of the superintendent as technology leader, although the literature indicated that school districts purchase technology devices for the purpose of student learning. There are ongoing studies examining the impact of 1:1 learning environments on student achievement. However, none of these studies specifically looked at the leadership actions taken to gain acceptance for these technology initiatives. With the lack of existing studies on superintendents as technology leaders, it is challenging to determine strong connections to the literature. However, this study does add to the existing literature on instructional leadership and the few studies on technology leadership that have been conducted.

Honig (2006) describes the role of district leaders as boundary spanners. Her research indicates that district level leaders serve as boundary spanners in schools as they search out strategies for reform in other arenas and bring them back to the district. Honig also argues that it is the superintendent who can support boundary spanners in their districts in order to increase their potential as levers of change. This is a shift from the traditional leadership model of top-down leadership to a relationship where the superintendent supports the schools in making key decisions about how to improve student learning. This idea was confirmed by our study, as we found the superintendent
supported the primary leader of the technology plan, which led to acceptance for the technology initiative.

At the commencement of this study there were no known research studies with a focus on the role of the central office in implementing technology initiatives. The only existing research focused on the role of the superintendent and central office in implementing instructional initiatives. When considering the existing literature on implementing instructional initiatives in schools, our findings indicate that similarities do exist between how superintendents successfully implement instructional initiatives and technology initiatives. With or without a technology component, similar patterns exist of collecting evidence, making sense of the evidence for stakeholders, and building capacity throughout the district to accept the large-scale technology initiative.

Each of the districts in this study went through a process of gathering evidence from other arenas and other districts to be able to make the best decisions for their individual circumstances. The difference in the case of technology initiatives is that there is not the assessment data that districts may rely on for instructional initiatives.

Coburn, Tourre & Yamashita (2009) defined sensemaking in the central office as leaders understanding evidence and enacting its use within a school district. This step allows district leaders to make their interpretations of the data and think about how it impacts their district. Brody, the superintendent in Washington was the primary leader of the technology initiative. The findings of this study indicate that the superintendents in Adams, Jefferson, Madison, and Monroe were persuaded by the primary leader of the technology initiative and in turn able to make the case for key stakeholders in order to gain acceptance. Once the primary leader was able to gain acceptance from the
superintendent in these districts, the superintendents then became integral to framing the initiative for all key stakeholders. Superintendents also needed to ensure that professional development opportunities were available to staff. Furthermore, superintendents had to address public relations issues to gain the support of the community and the school committee. This reinforces the research on capacity building as indicated in our review of the literature.

As noted, Spillane and Thompson (1997) found that capacity building requires investing in two critical forms of capital: *human capital* and *social capital*. Human capital is based upon the knowledge base of the people within the organizations and that the leadership has the knowledge, not only of the initiative, but also to teach people about the initiative. Social capital comes in the form of the trust and collaboration among educators within the district and the ability of the district to gain support from consultants outside of the district. If districts have the robust investment in human and social capital, the stakeholders are more apt to accept the initiative (Mulford, 2007; Spillane & Thompson, 1997). Frame theory and in particular, motivational framing as described in this study supports this investment in human and social capital. Without this investment, the superintendents in this study would not have been able to achieve resonance for the technology initiative. This study confirms that capacity building needs to be in place for technology initiatives in the same way it is necessary for instructional initiatives not involving technology. Superintendents in this study either took on the role of teaching stakeholders about the importance of the technology initiative or designated another district leader to perform this task.
Recommendations for Practitioners

The study results describe leadership actions that lead to gaining acceptance for large-scale technology initiatives. Districts that have not already implemented a large-scale technology initiative will benefit from this study by customizing our findings to their idiosyncratic situation and needs. These actions include the strategic processes that leaders took as outlined in the findings described in Chapter 4. Urban districts, districts that have more significant achievement gaps, or districts that face additional obstacles than described in the five districts of this study will need to adapt the recommendations to their own situation. For example, technology may be framed as the solution to differentiate instruction and close achievement gaps. Key to gaining acceptance is to identify key stakeholders and effectively communicate the importance of the technology initiative. These actions are intended to create resonance and support for the technology initiative, in turn leading to acceptance.

Prepare stakeholders for the initiative. All districts planned carefully for the implementation of their technology initiative. Districts that are currently in the planning process for a technology initiative can conduct a self-assessment or technology audit of their current level of technology by making comparisons to the districts in this study and others that have gained acceptance. Securing funding, identifying key players, and selecting which implementation model to pursue are all necessary steps in the process. Superintendents will need to both lead the public relations efforts and frame the initiative in order to get buy-in, or entrust this to a key leader in the district.

Communicate to key stakeholders. A highlight of our study was the necessity for effective superintendent communication, if support for the initiative was to grow
among all stakeholders. Superintendents or their designee need to be thoughtful and proactive in developing a public relations plan to be able to gain widespread support for the initiative. This study highlights different approaches to gaining acceptance taken in the five districts. But independent of the individual circumstances, we found that by framing the initiative, planning to deal with anticipated constraints, and strategically taking action a superintendent is well equipped to gain acceptance for a large-scale technology initiative.

**Hire and empower technology leaders.** Superintendents may or may not be the primary technology leader in the district. However, this study indicates the importance for superintendents to either identify the technology leaders in the district to lead this initiative or hire the right leaders for district-level and building-level positions. While acceptance of a large-scale project does depend on highly developed technical knowledge, we found that the superintendent need not possess technical expertise, so long as others in his administration or faculty do.

**Anticipate obstacles.** With federal and state departments of education implementing technology recommendations and mandates for districts, including online student assessments, an increase of funding for school districts is recommended. All of the superintendents in this study described some of the obstacles faced while trying to implement the technology initiatives in their districts. In addition to following the strategic actions that led to the superintendents in this study successfully gaining acceptance, it is recommended that uninitiated superintendents use this study to identify obstacles (constraints) they may encounter. The constraints that the superintendents in this study had to deal with are listed in the findings section. These constraints include
financial constraints, political constraints, competing interests, and staffing constraints. While our list is undoubtedly not exhaustive, it will offer leadership an opportunity to plan ahead to be able to address staffing issues, financial hurdles, or a political climate that may stand in the way of acceptance. Additionally, as superintendents across the country deal with mandates from a federal, state, and local level, our results indicate that the competing initiatives negatively impact the rollout of a technology implementation. It is therefore recommended that the number of initiatives be prioritized and, when possible, reduced in order to put as much focus on the implementation of the technology initiative as possible.

**Limitations**

Embedded in the considerations for future study are some of the limitations of this study. Among the limitations of this study is the limited scope and number of districts included. By expanding both the number of districts and including a wider spectrum of districts, there could be more generalizability of the results. Another limitation is the lack of urban districts and larger districts than the five districts in this study. Interviews were conducted of superintendents and the district and building-level leaders identified by the superintendent in each district. Participants who were identified by the superintendents to take part in our study may have been skewed to support the superintendent. Participants who weren't identified by the superintendent to participate in this study may have been hesitant to speak freely.

This study did not interview teachers, students, or parents or examine the impact of 1:1 learning environments on student achievement. In addition, this study did not quantify the use of technology in classrooms and by students in the five districts that
participated in this study. Nor did this study include districts where a large-scale technology initiative was attempted, but did not gain acceptance.

**Considerations for Future Study**

Taken collectively, the findings of this study as well as its limitations suggest several areas for possible future research. For example, a follow-up study could focus on the use of a diagnostic frame. Our study had just one district, Madison, where the diagnostic frame was explicitly utilized. Interestingly, this district had the lowest per capita income of the five districts in our study (bottom third in the state). To explore this possible connection between income level and the superintendent’s use of diagnostic framing, a further study should include a larger sample of school districts from communities with lower income levels (whether they are urban, suburban, or rural). A study that focuses on districts where the diagnostic frame was utilized to gain acceptance may result in different outcomes. We argue that how superintendents frame a large-scale technology initiative matters in terms of gaining acceptance. However, with only one district of five that utilized diagnostic framing, a study with a larger sample would enhance our research and the existing literature.

As noted, one limitation of this study is the number of districts studied. Due to time constraints, this study focused on five districts. These districts consisted of four suburban districts and one rural district. Further research should study the similarities and differences of large-scale technology initiatives in rural, urban and suburban school districts. The five districts in this study demonstrate that there are different approaches to framing initiatives while moving towards a 1:1 learning environment. While these
conditions may limit the legitimate generalization (Bem 2003) of the data, it is our belief that the data of this study can in fact be useful to districts of any size and in any location.

This study described the leadership actions in five districts that have gained acceptance for their technology initiative. This study did not, however, include any counter examples – districts where the technology initiatives were not supported. Therefore, a limitation of our study is that we are unable to estimate the role frame theory might play in a district that did not gain acceptance or where district leaders were unable to create resonance for the technology initiative. For example, in a study of districts where a technology initiative did not gain acceptance, we could examine the specific constraints district leadership faced.

Our study had a limited sample size of Bring Your Own Device (BYOD) districts. Future studies of BYOD districts could examine resources invested in technology and if technology use in classrooms is a lesser priority than in a school with district-funded devices.

While this study was focused on the leadership actions taken to gain acceptance for large-scale technology initiatives, future research could examine the impact of 1:1 learning environments in these five districts.

According to the research conducted for this study, there are a variety of approaches that can be taken when implementing a large-scale technology initiative. The study results highlight the many constraints superintendents face as they try to implement a technology initiative. These constraints included funding and competing initiatives. A related area of research would be an analysis of federal and state initiatives that interfere with time that could otherwise be utilized for professional development related to
technology initiatives. Thus another related research topic could be the lack of funding that is missing from state and federally mandated initiatives in education. Without sustained funding, large-scale technology initiatives are at risk of failing after the initial budget is exhausted. This study highlights the creative ways in which districts are funding technology initiatives. If assessments of the Common Core are to be electronic and the national and state departments of education continue to push more technology in schools, a funding structure will need to be developed so that there is equity amongst all districts.

Another area for future study is to interview teachers in the districts that gained acceptance for technology initiatives. Our study did not measure the degree of resonance that was achieved in each district. This study was focused on leadership actions that led to acceptance for the technology initiative. This study defined acceptance as mobile devices in the hands of students. The study did not describe or investigate the rate of integration of technology into the curriculum. One possible future study would be to look at one or more of the districts studied here and include interviews of teachers, students, and parents with a focus on resonance rather than leadership actions. Such a study would be able further the research on instructional initiatives.

**Conclusion**

This study was conducted to help district leaders frame the implementation of a large-scale technology initiative for the purpose of gaining acceptance, and to contribute to the limited body of research detailing how leaders of organizations gain acceptance of a large-scale program, such as a 1:1 device initiative. The research team also conducted five thematic studies that address how superintendents utilize distributed leadership
(Turner, 2014), instructional vision (Flanagan, 2014), professional learning communities (Nolin, 2014), technology decision-making (Arnold, 2014), and the superintendent’s use and attitudes regarding technology (Cohen, 2014). While all five research areas presented some very unique findings relative to the area of study that are found in each individual chapter, they also uncovered two common themes across these five spokes.

**Superintendents’ interaction with others.** Whether implementing an instructional vision, developing professional learning communities or making decisions regarding the technology infrastructure, all superintendents in this study relied on interactions with district administrators and communication with all stakeholders to help gain acceptance of their large-scale technology initiative. As the study on distributed leadership concluded, superintendents relied on primary leaders/key framers of their district administrative team to develop and implement their technology initiative in all areas of the five individual studies.

**The development of strategic processes.** As outlined in this study, superintendents utilized a variety of strategic processes in connection with prognostic and motivational framing to generate acceptance of their technology initiative. Across all spokes of this study, superintendents identified district-wide issues related to the individual focus areas and charted out strategic plans to help address these issues. In preparing for the initiative, the instructional vision, professional learning opportunities, leadership teams, technology infrastructure and communication avenues were all considered as elements necessary to build buy-in for the initiative. These focus areas were continued throughout the implementation phase of the initiative.
Additionally, the strategic process of developing professional learning opportunities related to the initiative was also interwoven within the five spokes. Professional development focused on advancing the instructional vision of the district, and involved the assistance of primary leaders/key framers, took into account the technology tools and infrastructure of the district and was communicated by the superintendent through various avenues including social media, blogs, newsletter and the district website.

The study focuses on the leadership actions that superintendents employ when working to gain acceptance of a technology initiative. The study results show that the superintendent’s framing of the technology initiative and strategic actions that are utilized throughout the initiative are vital to developing resonance, and ultimately acceptance by stakeholders.

This descriptive study of five school districts that have each gained acceptance for a large-scale technology initiative serves to inform leadership actions for district leadership considering a 1:1 learning initiative. A 2010 white paper from the Massachusetts Department of Elementary and Secondary Education states, “The superintendent has the responsibility to initiate and guide the transformation of the teaching staff from instructor/lecturer to mentors and guides who effortlessly utilize technology whenever it is appropriate and beneficial.” There is a movement across all levels of education to put mobile devices in the hands of students. This study earnestly begins what we predict will be a growing body of research to better serve, inform, and evolve future implementations of large-scale technology initiatives.
References


Authors: Erik Arnold, Peter Cohen, Henry Turner, Anna Nolin, Gina Flanagan


doi:10.1111/j.1365


DuFour, R. (2004). What is a “professional learning community?” *Educational leadership, 61*(8).


Eisele-Dyrli, K. (2011). Finding the right purchasing solution: Technology administrators share strategies for purchasing the products and technology that will be most effective at meeting district needs. *District Administration, 47*(7), 54.


McLester, S. (2012). Keeping pace with technology innovation: Learn valuable tips, shortcuts and resources to help your district stay on the upside of the digital divide. *District Administration, 48*(9), 76.


Norris, C., & Soloway, E. (2011). From banning to BYOD: This inevitable shift is at the heart of school change. *District Administration, 47*(5), 94.


Rochelle, N. (2009). To blog or not to blog? A superintendent's response to the critics who say blogging is time-consuming and has no merit for school leaders. *School Administrator, 66*(7), 17.


http://www.jstor.org/action/showPublication?journalCode=elemschoj


http://www.pcworld.com/article/244603/tablet_reliability_and_satisfaction_ipad_comes_out_on_top.html


Watters, A. (2012). To have and to have not: When it comes to the latest technology, some schools are more equal than others. *School Library Journal*, 58(5), 34.


Appendices

Appendix A: Letter Inviting Accessible Population to Interview via Phone

Dear (name of person):

We are writing as current doctoral candidates in the Boston College PSAP program to invite you to participate in our dissertation research. The purpose of this study is to increase the knowledge about how superintendents make decisions and go about the process of gaining acceptance for large-scale technology initiatives in their school systems. We seek to uncover descriptions of superintendent leadership that bring about successful technology implementations. We invite you to signal your willingness to participate in our study by completing a 15-minute phone interview. The interview asks you some initial questions about your experiences.

If selected as a potential candidate for this study, you will be contacted to schedule a 1 hour interview with one of the five research team members at a location convenient for you, sometime during August-October. You will also be asked to sign the attached Consent to Participate form, and possibly to review the interview transcript sometime during September-October.

Participation in the research is voluntary, and you may withdraw at any time. Your responses will be confidential. The phone interview must be completed by August 15, 2013. To agree to participate, please email Anna Nolin at annanolin@aol.com. She will then send you the letter of consent required before the phone conversation can begin. If you have any questions about the study or the participant selection, please contact the principal investigator, Anna Nolin, annanolin@aol.com.

With respect,

Boston College EdD Candidates Class of 2014
Appendix B: Questions for Superintendents in Initial Phone Screening

Interviews for Site Selection Purposes

1. What type of 1:1 initiative is in place? (design, grade levels) Were you the superintendent at the time of the 1:1 initiative’s inception? How long has the 1:1 initiative been in place?

2. Is there a goal for technology use in a district plan that is related to an instructional vision?

3. Do you use social media to communicate with your school constituencies?

4. Was the use of a leadership team a critical part of the technology implementation process?

5. Does the district rely on a collaborative culture or professional learning communities (PLCs) to assist with program implementation efforts or with professional development?

6. Would you be interested in being interviewed for a study of superintendent leadership that inspires 1:1 implementations?
Appendix C: Consent to Participate in Phone Interviews (Superintendents)

You are being asked to participate in a research study titled Framing Innovation: What do Superintendents do to Gain Acceptance of Large-Scale Technology Initiatives?

You were selected to participate in this project because you are a superintendent who is implementing or has recently implemented an accepted large-scale technology implementation.

The purpose of this study is to discover, describe and explain the actions superintendents take to gain community and staff acceptance of such a technology implementation in their schools systems.

This portion of the study will be conducted through a brief six-question phone interview. This interview should take you approximately fifteen minutes to complete. There are no direct benefits to you, but you may feel gratified knowing that you helped further the scholarly work in this research area. You will not be compensated for the time you take to complete this survey. There are no costs to you associated with your participation. This Principal Investigator will exert all reasonable efforts to keep your responses and your identity confidential. In any sort of report we may publish; we will not include any information that will make it possible to identify you as a participant. Research records will be kept in a locked file in the home office and secured computer of the principal investigator of the team. All electronic information will be coded and secured using a password-protected file. Please note that regulatory agencies, the Boston College Institutional Review Board, and Boston College internal auditors may review research records.
Your participation is voluntary. If you choose not to participate it will not affect your relations with Boston College. You are free to withdraw or skip questions for any reason. There are no penalties for withdrawing or skipping questions.

If you have questions or concerns concerning this research you may contact the Principal Investigator, Anna Nolin at annanolin@aol.com.

If you have questions about your rights as a research participant, you may contact the Office for Research Protections, Boston College, at 617-552-3345 or irb@bc.edu.

This study was reviewed by the Boston College Institutional Review Board and its approval was granted on XXXXXX.

If you agree to the statements above and agree to participate in this study, please press the “Consent Given” button below.
Appendix D: Consent to Participate in Interview

Boston College Lynch School of Education

Informed Consent for Participation as a Subject in:
Framing Innovation: What do Superintendents do to Gain Acceptance of Large-Scale Technology Initiatives?

Investigators: Erik Arnold, Peter Cohen, Gina Flanagan, Anna Nolin, Henry Turner

PSAP EdD Candidates Class of 2014

Type of Consent: Adult Consent

Introduction
You are being asked to be in a research study to increase the knowledge about how superintendents make decisions related to large-scale technology initiatives. You were selected as a possible participant because you are a superintendent who has recently taken a school district through a large-scale technology implementation which was accepted by your school district community. We ask that you read this form and ask any questions that you may have before agreeing to be in the study.

Purpose of study
The purpose of this study is to understand how superintendents implement large-scale technology initiatives and go about the process of gaining acceptance for these projects in their school systems. We seek to uncover descriptions of superintendent leadership that brings about such successful technology implementations. The total number of participant districts in the study is expected to be five.

Members of the research team do not have any financial interest in the study.
Description of the Study Procedures

If you agree to be in this study, we would ask you to the following things: participate in a 1-1 ½ hour in-person interview. In addition, you will be given the opportunity, if you choose to do so, to review the interview transcript for accuracy; it is estimated that this will take approximately 1 hour.

Risks/Discomforts, Benefits of Being in the Study

There are no reasonable foreseeable risks to participation. There are no direct benefits to you from participating in the study. However, the findings may be useful to school leaders, school boards and superintendents, school districts and schools of education as they prepare administrators for school district leadership positions, and preparation programs.

Payments/Costs/Voluntary Participation

Your participation in this study is completely voluntary. There is no penalty for not participating. There are no payments to you, nor costs to you to participate in the study.

Confidentiality

The records of this study will be kept confidential. In any sort of report we may publish, we will make every effort not to include any information that will make it possible to identify a participant. Research records will be kept in a locked file in the home office and secured computer of the principal investigator of this study team. All electronic information will be coded and sealed using a password protected file. Audio tape recordings will be held by the individual interviewer until a transcription has been completed and confirmed for accuracy. Those interview recordings will then be destroyed.
Access to the records will be limited to the researchers; however, please note that the Institutional Review Board and internal Boston College auditors may review the research records.

**Voluntary Participation/Withdrawal**

Your participation is voluntary. If you choose not to participate, it will not affect your current or future relations with the University. You are free to withdraw at any time for whatever reason. There is no penalty or loss of benefits for not taking part or for stopping your participation. You will be provided with any significant new findings that develop during the course of the research that may make you decide that you want to stop participating. In addition, if you are selected for the interview, you may refuse to answer individual questions but continue with participation in the study.

**Dismissal From the Study**

The investigator(s) may withdraw you from the study at any time for the following reasons: (1) withdrawal is in your best interests, (2) you have failed to comply with the study requirements, or (3) the study is terminated.

**Contacts and questions**

The researchers conducting this study are current doctoral students in the PSAP program at Boston College: Erik Arnold, Peter Cohen, Gina Flanagan, Anna Nolin and Henry Turner

For questions or more information concerning this research you may contact the principal investigator, Anna Nolin annanolin@aol.com.
If you have any questions about your rights as a research subject, you may contact:
Director, Office for Research Protections, Boston College at (617) 552-4778, or irb@bc.edu

Copy of Consent Form
You will be given a copy of this form to keep for your records and future reference.

Statement of Consent
I have read the contents of this consent form and have been encouraged to ask questions.
I have received answers to my questions. I give my consent to participate in this study. I have received (or will receive) a copy of this form.

Signatures/Dates
Study Participant (Print Name)______________________________________________________
Participant Signature____________________________________________________________
Appendix E: Interview Protocol & Guide

Notes to Interviewer

This interview guide is intended to provide consistency among interviewers using an exploratory format. Our goal is to explore the domains revealed in the literature to review under the categories of prognostic framing and collective action framing, and also under our individual spoke areas of interest: instructional focus, distributed leadership, strategic decision-making regarding technology, identify new domains. Further, the goal is to break those domains down into component factors and subfactors, within the context of each individual participants’ situation. The tone of the interview should be conversational, informal and feel as though the participant has been asked to tell you a story; please employ an interviewer-as-listener approach. Stay alert and engaged in the discussion and respond with agility to turns in the conversation, the needs for further exploration, the participant’s body language and facial expressions. Please take field notes while you are conducting the interview. Field notes should include any relevant body language, non-verbal cues, meanings of phrases, silences, pauses, etc. that may have impact on the line of questioning. These notes should be included in the NotesPlus App used for voice recording so the notes and the audio files travel in a unified fashion.

Tips for using the guide:

- Be responsive to the cues of the participant and be flexible about asking questions in a different order.
- Skip questions if the topic has already been covered.
- Ask probing follow-up questions to elicit richer, more thoughtful answers, and ask about topics the interviewee has not yet voluntarily identified.
• Respond to signals of reluctance if the participant seems to want to skip questions or end the interview.

• Do not solicit private information that is not related to the research question, and will dissuade revelation of irrelevant personal information if it happens spontaneously.

• If participants continue to talk after the recording device is turned off, ask permission to continue to record or to take notes to include the additional pertinent information.

• Limit your own discussion, affirmation of responses, and interaction with the subject save to establish and keep rapport.

• Keep a laser-like focus on the subject, the questions related to the central phenomenon and related sub questions.

• Participants must not be manipulated to respond to questions in a particular fashion.
**Superintendent Interview Protocol**

Thank you for agreeing to participate in our study.

My name is ______________ and I am one of five Boston College doctoral students conducting a study of district leaders and how they gain acceptance for a large-scale technology initiative.

First, let me explain the project.

The purpose of this study is to study how district leaders and teams gain acceptance for large-scale technology initiatives in their school district communities. We will also explore leadership distribution, strategic planning, communication modes, and the instructional and learning organization features of these districts to determine the relationship between leader actions and these constructs.

At the conclusion of this study we will prepare a report. We are happy to send you a copy of that report if you are interested. Shall we send the report to your email at ______________? YES NO

Now, a little about the interview.

As a team we are interviewing approximately five participants.

We have several questions that we are asking all participants; I will try to pace the interview so that we can conclude within one hour. Please understand that your responses are completely confidential. If we use a quote in our report, we will make sure it is not attributable to any particular interviewee.

All questions are optional – if there is any question you want to skip or if you want to stop the interview at any time, just let me know. I plan to take notes while we are talking; is it OK if I also record the interview for transcription?
Do you have any questions before we begin?

We are going to begin by asking you some questions regarding your views on instruction. For the purpose of this study, instructional vision will be defined as the instructional and organizational practices, theories, philosophies and beliefs that lay the foundation to achieving educational goals. We will also be asking you questions on how these views relate to your views on technology.

1. What is your vision for teaching and learning in your district?
   a. How was this instructional vision developed (what was the process, who was involved)?
   b. What is your role in supporting the instructional vision?

2. What evidence is there of the instructional vision taking shape throughout your district (resources, programs, PD, etc.)?

3. What role do you think technology ought to play in teaching and learning?
   a. How is that communicated to all stakeholders (leadership team, teachers, students, parents)? Please explain.

4. Where did the idea of developing a 1:1 program come from? (policy window/strategic alignment)

5. What problem did you hope to solve by implementing the 1:1 or BYOD program in your district.

6. Please describe the technology initiative in its current state.
   a. What initiatives were also being implemented at the time of the technology implementation (to determine co-implementation)?
7. Who did you need to convince to get buy-in and how did you go about this?

8. Who helped you lead the district through this technology initiative?
   a. Why did you choose to work with these people?
   b. How did you know who you wanted to work with?
   c. What was it like to work with these people?

9. What did working with these different people look like?
   a. How did you choose to work with them individually or in a group?

10. In what ways did these people work with each other to implement the plan?
    a. Did you have a role in helping people work together?
    b. How did you know what they were working on?

11. What factors did you consider when determining how to fund the technology initiative? [possible responses: sustainability, SES of families in the district, political pressure, school budget]

12. How, if at all, did the funding design impact the acceptance of the 1:1 initiative?

13. What were the main reasons that led you to choose this specific mobile device? (not applicable if BYOD) [Possible responses: cost, reliability/durability, brand reputation, included support from the vendor, free or packaged software applications, warranty, battery life, photo/video capabilities, ease of use, portability]
   a. How did the mobile device that was chosen (or BYOD program) impact the use of the device among teachers & students?

14. Describe the reliability of your wireless network and how it has impacted the 1:1 initiative.
15. How did the capacity of your existing technology staff to support the initiative figure into your decision-making? [possible responses: limited staff, adequate staff, could/could not hire more]

16. Describe structures that exist in the district around educator collaboration--formal and informal related to teaching and learning.
   
a. What are your expectations around collaboration--collaborative culture--structured collaboration around teaching and learning and how is that embedded in the culture?

b. How is educator collaboration related to technology implementation?

c. Related to implementation of any educational innovation in general, are there expectations for educator collaboration?

17. Does the collaboration of teachers play a role in the implementation of the technology initiative? Is there formal time set aside for teachers to collaborate?

18. What technologies are most important to your job? What do you actually spend the most time using? What about at home?
   
a. Follow up with specifics about blogs and social media

19. What are the benefits of these technologies that you mentioned? What complaints do you have?

20. How does your district support technology use? What’s your role?
   
a. What training, activities, actions or documents helped to ease the implementation of this initiative in your system?

21. How do you feel about the direction your district is taking in regard to technology? Are these views you have shared with others?
22. In hindsight, would you have done anything differently with the implementation of the 1:1 initiative?

23. In what areas were you hoping this initiative would help your district?
Non-Superintendent Interview Protocol

Thank you for agreeing to participate in our study.

My name is _____________ and I am one of five Boston College doctoral students conducting a study of district leaders and how they gain acceptance for a large-scale technology initiative.

First, let me explain the project.

The purpose of this study is to study how district leaders and teams gain acceptance for large-scale technology initiatives in their school district communities. We will also explore leadership distribution, strategic planning, communication modes, and the instructional and learning organization features of these districts to determine relationship between leader actions and these constructs.

At the conclusion of this study we will prepare a report. We are happy to send you a copy of that report if you are interested. Shall we send the report to your email at ______________________________? YES NO

Now, a little about the interview.

As a team we are interviewing approximately five districts.

We have several questions that we are asking all participants; I will try to pace the interview so that we can conclude within one hour. Please understand that your responses are completely confidential. If we use a quote in our report, we will make sure it is not attributable to any particular interviewee.
All questions are optional – if there is any question you want to skip or if you want to stop the interview at any time, just let me know. I plan to take notes while we are talking; is it OK if I also record the interview for transcription?

Do you have any questions before we begin?

We are going to begin by asking you some questions regarding your views on instruction.

For the purpose of this study, instructional *vision* will be defined as the instructional and organizational practices, theories, philosophies and beliefs that lay the foundation to achieving educational goals. We will also be asking you questions on how these views relate to your views on technology.

1. What is the vision for teaching and learning in the district?
   a. How was this instructional vision developed (what was the process, who was involved)?
   b. What is your role in supporting the instructional vision?

2. What evidence is there of the instructional vision taking shape throughout the district (resources, programs, PD, etc.)?

3. What role do you think technology ought to play in teaching and learning?
   a. How is that communicated to all stakeholders (leadership team, teachers, students, parents)? Please explain.

4. Where did the idea of developing a 1:1 program come from? (policy window/strategic alignment)

5. Please describe the technology initiative in its current state.
a. What initiatives were also being implemented at the time of the technology implementation (to determine co-implementation)?

6. Who needed to be convinced to get buy-in and how was that accomplished, or not accomplished?

7. Describe your role in the implementation of the 1:1 initiative?
   a. What was it like to work with the superintendent on the 1:1 initiative?

8. Who else was instrumental in implementing the 1:1 initiative?
   a. Did you work with them individually or in a group?
   b. What was it like to work with these people?
   c. In what ways did these people work with each other to implement the plan?
   d. Did you have a role in helping people work together?
   e. How did you know what they were working on?

9. What factors were considered when determining how to fund the technology initiative? [possible responses: sustainability, SES of families in the district, political pressure, school budget]

10. How, if at all, did the funding design impact the acceptance of the 1:1 initiative?

11. What were the main reasons that the specific mobile device was chosen? (not applicable if BYOD) [Possible responses: cost, reliability/durability, brand reputation, included support from the vendor, free or packaged software applications, warranty, battery life, photo/video capabilities, ease of use, portability]
a. How did the mobile device that was chosen (or BYOD program) impact
   the use of the device among teachers & students?

12. Describe the reliability of the wireless network and how, it at all, it has impacted
    the 1:1 initiative.

13. How did the capacity of the existing technology staff to support the initiative
    figure into the decision-making about the 1:1 initiative? [possible responses:
    limited staff, adequate staff, could/could not hire more]

14. Describe structures that exist in the district around educator collaboration--formal
    and informal related to teaching and learning.

   a. What are the superintendent’s expectations around collaboration--
      collaborative culture--structured collaboration around teaching and
      learning and how is that embedded in the culture?

   b. How is educator collaboration related to technology implementation?

   c. Related to the implementation of any educational innovation in general,
      are there expectations for educator collaboration?

15. Did the collaboration of teachers play a role in the implementation of the
    technology initiative? Is there formal time set aside for teachers to collaborate?

16. What technologies are most important to your job? What do you actually spend
    the most time using? What about at home?

   a. Follow up with specifics about blogs and social media

17. What are the benefits of these technologies that you mentioned? What complaints
    do you have?

18. How does the district support technology use? What’s your role?
a. What training, activities, actions or documents helped to ease the implementation of this initiative in your system?

19. How do you feel about the direction the district is taking with regard to technology? Do you share these views with others in the district?

20. In hindsight, should anything have been done differently with regards to the implementation of the 1:1 initiative?
Appendix F: Format for Interim Summaries

Case Analysis Form: __________________________

(Adapted from Miles & Huberman, 1994, p. 78)

1. Main themes, impressions, summary statements about what is going on at the site/with the superintendent/leadership team:

2. Explanations, speculations, hypotheses: about what is going on at the site/with the superintendent/leadership team:

3. Alternative explanations, minority reports, disagreements site/with the superintendent/leadership team:

4. Next steps for data collection: follow up questions, specific actions, general directions field work should take:

5. Implications for revision, updating of coding scheme:
### Appendix G: State School Districts With PLC Aspects

**Randomized Web Search, May 2013**

<table>
<thead>
<tr>
<th>District Name</th>
<th>Web Post Involving PLC Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na***** Public Schools</td>
<td>District Plans involve mandatory PLC goals for all staff and schools</td>
</tr>
<tr>
<td>Ne***** Public Schools</td>
<td>District Plan and all school improvement plans indicate PLC (named GLDs) goals</td>
</tr>
<tr>
<td>No***** Public Schools</td>
<td>PLC resource page</td>
</tr>
<tr>
<td>Li***** Public Schools</td>
<td>Information about PLCs setting coordinated learning goals</td>
</tr>
<tr>
<td>Me***** Public Schools</td>
<td>Case study of their school system making improvement strides using PLC constructs</td>
</tr>
<tr>
<td>Ho******* Public Schools</td>
<td>Technology PLC is referenced prominently in strategic plan</td>
</tr>
<tr>
<td>Su***** Public Schools</td>
<td>School committee presentation indicating the 2011 implementation of PLCs in elementary schools around math achievement</td>
</tr>
<tr>
<td>No********** Public Schools</td>
<td>Published schedule of technology PLC meetings</td>
</tr>
<tr>
<td>So*** De******* Public Schools</td>
<td>Math PLC collaborative description K-8</td>
</tr>
<tr>
<td>Le******* Public Schools</td>
<td>District Improvement Goals Including PLCs writing new Common Core Curriculum and aligning using Atlas Rubicon.</td>
</tr>
<tr>
<td>Hu**** Public Schools</td>
<td>Adoption of PLC constructs into instructional improvement goals</td>
</tr>
<tr>
<td>Ch******* Public Schools</td>
<td>Videos of teachers discussing the power of collaboration in their PLCs for implementing UDL strategies in curriculum design.</td>
</tr>
<tr>
<td>Am***** Public Schools</td>
<td>Description of technology regional PLC group formed to learn about technology implementation</td>
</tr>
<tr>
<td>Wh********** Public Schools</td>
<td>Formal presentation to school committee detailing PLCs, what they are and why the district will use them and how</td>
</tr>
<tr>
<td>We********** Public Schools</td>
<td>Collaborative co-teaching study groups create common assessments and share results (school plan)</td>
</tr>
<tr>
<td>Ne******* Public Schools</td>
<td>Identified resource in school improvement plans</td>
</tr>
<tr>
<td>School District</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ho****** Public Schools</td>
<td>Identified resource in school improvement plans</td>
</tr>
<tr>
<td>Me****** Public Schools</td>
<td>Identified as core part of district operations in school improvement plans</td>
</tr>
<tr>
<td>Mi***** Public Schools</td>
<td>Videos of teachers engaged in PLC work; identifying as “heart” of instructional work</td>
</tr>
<tr>
<td>Au***** Public Schools</td>
<td>Entire website devoted to the retooling of schedules, budget, training to embrace PLCs</td>
</tr>
<tr>
<td>Mi***** Public Schools</td>
<td>Initiative overview 2011-12 to begin PLCs in district</td>
</tr>
<tr>
<td>We**** Public Schools</td>
<td>District PD page overviews 30 hours of sustained PD for PLCs</td>
</tr>
<tr>
<td>We****** Public Schools</td>
<td>In various school improvement plans and posted school committee notes</td>
</tr>
<tr>
<td>As***** Public Schools</td>
<td>Posted a part of negotiated teacher contract</td>
</tr>
<tr>
<td>Gr***** Public Schools</td>
<td>Letter from NSA indicating that the technology PLCs in the town were impressive and grant worthy</td>
</tr>
<tr>
<td>Gr****-Du****** Schools</td>
<td>Job Description of curriculum leaders—primary role: leadership of PLCs</td>
</tr>
<tr>
<td>Ma***** Public Schools</td>
<td>Superintendent's Newsletter hiring new principal and citing his PLC experience as a plus</td>
</tr>
<tr>
<td>Av** Public Schools</td>
<td>School improvement plans/articles celebrating improvement due to PLCs</td>
</tr>
<tr>
<td>We***** Public Schools</td>
<td>PLCs defined in key glossary of district terms</td>
</tr>
<tr>
<td>Fr*****-La****** Schools</td>
<td>5-year plan relies on PLCs to implement goals</td>
</tr>
</tbody>
</table>
Appendix H: Scholarly Articles Referencing PLC Constructs

in Describing Technology Leadership

<table>
<thead>
<tr>
<th>PLC construct</th>
<th>Technology Leadership Characteristics</th>
<th>Leadership Characteristics for Effective Reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Mission, vision, values</td>
<td>Robertson et al. (2007)</td>
<td>Leithwood et al. (2007) (types of alignment),</td>
</tr>
<tr>
<td></td>
<td>Flanagan &amp; Jacobsen, 2003</td>
<td>Seashore et al. (2009) (leadership type dependent</td>
</tr>
<tr>
<td></td>
<td>Anderson &amp; Dexter (2000/2005)</td>
<td>upon this area)</td>
</tr>
<tr>
<td></td>
<td>Schrum et al. (2011)</td>
<td>them)</td>
</tr>
<tr>
<td></td>
<td>Christensen (2008)</td>
<td>systems)</td>
</tr>
<tr>
<td>Collective inquiry</td>
<td>Williams et. al (2008)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(learning how to learn together)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seashore et al. (2009) (shared vs. distributed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>leadership &amp; teacher self-organization)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frank &amp; Zhao (2003)</td>
</tr>
<tr>
<td>Action Orientation/Experimentation</td>
<td>Shapely (2010)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phillips (2005)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Christensen (2008)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anderson &amp; Dexter (2000)</td>
<td>discussions)</td>
</tr>
<tr>
<td></td>
<td>Robinson (2008)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Schrum et al. (2011)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Schrum et al. (2011)</td>
<td>and connection to student achievement)</td>
</tr>
<tr>
<td></td>
<td>Phillips (2005)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Christensen (2008)</td>
<td></td>
</tr>
</tbody>
</table>
Appendix I: Defined Terms

- **Social Media** - Technology used for communication and interactive dialogue (Nussbaum-Beach, 2012).
- **Web 2.0** - applications that facilitate information sharing and collaboration online (Nussbaum-Beach, 2012).
- **Blog** – web log or website or an online journal that is updated regularly by the blogger
- **Facebook** – social networking website
- **Twitter** – an instant messaging system that allows users to send messages of up to 140 characters in length to a list of followers
- **Acceptance** – (working definition) mobile devices in the hands of students
- **Large-scale technology initiative** – technology adoptions in public schools that seek to provide 1:1 computing or tablet device for every student in a section or level of the school system, e.g. one tablet or laptop for all students in grades 8-12.
### Appendix J: Initial Codes - Instructional Vision & Technology Implementation

<table>
<thead>
<tr>
<th>CODE</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1 21st Century Learning Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision focuses on critical thinking, collaboration, problem solving, technology use.</td>
</tr>
<tr>
<td>RQ Authentic Learning Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that instructional vision provides students with real world experiences and problem solving skills.</td>
</tr>
<tr>
<td>RQ 1 Collaboration Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports the development of collaboration skills.</td>
</tr>
<tr>
<td>RQ 1 College &amp; Career Readiness Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision provides student the skills for students to be prepared for college and career.</td>
</tr>
<tr>
<td>RQ 1 Communication Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports the development of communication skills with students.</td>
</tr>
<tr>
<td>RQ 1 Creativity Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports the development of creativity and innovation skills with students.</td>
</tr>
<tr>
<td>RQ 1 Critical Thinking Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports the development of critical thinking and problem solving skills with students.</td>
</tr>
<tr>
<td>RQ 1 Literacy Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports for the development of reading and writing skills with students.</td>
</tr>
<tr>
<td>RQ 1 Student Engagement Focus</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports students as active participants in the psychological and behavioral aspects of their learning.</td>
</tr>
<tr>
<td>RQ 1 Technology Use</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports the development of technology use skills with students.</td>
</tr>
<tr>
<td>RQ 1 Whole Child-</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that supports the health and safety of each student and ensures they are engaged, supported and challenged by working with all stakeholders they are engaged, supported and challenged by working with all stakeholders.</td>
</tr>
<tr>
<td>RQ 1 Differentiated Instruction</td>
<td>Superintendent Instructional Focus</td>
<td>Direct statement from the superintendent that the instructional vision supports attending to the learning needs of a particular student or small group of students rather than the more typical pattern of teaching the class as though all individuals in it were basically alike.</td>
</tr>
<tr>
<td>CODE</td>
<td>TYPE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>RQ 1 21st Century Learning</td>
<td>Superintendent</td>
<td>Direct statement from the superintendent that the instructional vision focuses on critical thinking, collaboration, problem solving, technology use, real world experiences, creativity and innovation</td>
</tr>
<tr>
<td>RQ 2 21st Learning &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology provides students the skills all 21st century learning skills</td>
</tr>
<tr>
<td>RQ Authentic Learning &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology supports authentic learning experiences</td>
</tr>
<tr>
<td>RQ Collaboration &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology supports collaboration</td>
</tr>
<tr>
<td>RQ 2 Literacy &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology is used to support the development of reading and writing skills</td>
</tr>
<tr>
<td>RQ 2 Critical Thinking &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology is used support critical thinking skills</td>
</tr>
<tr>
<td>RQ 2 CCR &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology is used to support college &amp; career readiness skills</td>
</tr>
<tr>
<td>RQ 2 Whole Child &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology is used to support the whole child approach</td>
</tr>
<tr>
<td>RQ 2 Engagement &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology supports student engagement</td>
</tr>
<tr>
<td>RQ Communication &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology supports communication skills</td>
</tr>
<tr>
<td>RQ 2 Creativity &amp; Technology</td>
<td>Technology</td>
<td>Example provided of how technology supports creativity skills</td>
</tr>
<tr>
<td>RQ 3 Supt. creates IV</td>
<td>Utilization of the Instructional Vision</td>
<td>Example provided of how the superintendent created the instructional vision</td>
</tr>
<tr>
<td>RQ 3 Supt. communicates IV</td>
<td>Utilization of the Instructional Vision</td>
<td>Example provided of how the superintendent communicates the instructional vision</td>
</tr>
<tr>
<td>RQ 3 Supt. helps implement IV</td>
<td>Utilization of the Instructional Vision</td>
<td>Example provided of how the superintendent helps to implement the instructional vision</td>
</tr>
<tr>
<td>RQ 3 Supt. IDs constraints with IV &amp; Tech.</td>
<td>Utilization of the Instructional Vision</td>
<td>Constraint between the instructional vision and technology is identified by the superintendent</td>
</tr>
<tr>
<td>RQ 3 DA involved with IV development</td>
<td>Utilization of the Instructional Vision</td>
<td>District administrator states or gives an example of how he/she was involved in the development of the instructional vision</td>
</tr>
<tr>
<td>CODE</td>
<td>TYPE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>RQ 3 DA</td>
<td>Utilization of the</td>
<td>District administrator communicates the instructional vision</td>
</tr>
<tr>
<td>IV</td>
<td>Instructional Vision</td>
<td>*Instructional visions articulated by each district administrator was categorized in the same manner as the superintendents (see RQ 1 list on this table)</td>
</tr>
<tr>
<td>IV Time</td>
<td>Utilization of the</td>
<td>Time is created to provide support to the Instructional Vision</td>
</tr>
<tr>
<td>IV</td>
<td>Instructional Vision</td>
<td></td>
</tr>
<tr>
<td>IV Data</td>
<td>Utilization of the</td>
<td>Data is connected to the instructional vision</td>
</tr>
<tr>
<td>IV</td>
<td>Instructional Vision</td>
<td></td>
</tr>
<tr>
<td>IV Resource</td>
<td>Utilization of the</td>
<td>Resources are identified that help support the instructional vision</td>
</tr>
<tr>
<td>IV</td>
<td>Instructional Vision</td>
<td></td>
</tr>
<tr>
<td>IV Communication</td>
<td>Utilization of the</td>
<td>Instructional vision is communicated</td>
</tr>
<tr>
<td>IV</td>
<td>Instructional Vision</td>
<td></td>
</tr>
<tr>
<td>IV Program</td>
<td>Utilization of the</td>
<td>Programs are implemented to support the instructional vision</td>
</tr>
<tr>
<td>IV</td>
<td>Instructional Vision</td>
<td></td>
</tr>
<tr>
<td>IV PD</td>
<td>Utilization of the</td>
<td>Professional developed is offered to support the instructional vision</td>
</tr>
<tr>
<td>IV</td>
<td>Instructional Vision</td>
<td></td>
</tr>
<tr>
<td>MO Frame</td>
<td>Frame Theory</td>
<td>Instructional vision used as motivational framing</td>
</tr>
<tr>
<td>PR Frame</td>
<td>Frame Theory</td>
<td>Instructional vision used as prognostic framing</td>
</tr>
<tr>
<td>DI Frame</td>
<td>Frame Theory</td>
<td>Instructional vision used for diagnostic framing</td>
</tr>
</tbody>
</table>

*Note: RQ 1 is associated with research question one. RQ 2 is associated with research question two. RQ 3 is associated with research question number three.*
### Appendix K: Codes for Superintendent Technology Use & Attitudes

<table>
<thead>
<tr>
<th>Parent Code</th>
<th>Child Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Technology B = Blog</td>
<td>E = Email</td>
</tr>
<tr>
<td>Use of Technology PP = PowerPoint</td>
<td>SM = Social Media</td>
</tr>
<tr>
<td>Use of Technology COL = for collaboration</td>
<td>COM = for communication</td>
</tr>
<tr>
<td>Attitudes About Technology CCCC = for 21st century skills</td>
<td>CCR = for college and career ready</td>
</tr>
<tr>
<td>Attitudes About Technology DATA = for data collection/use</td>
<td>DI = for differentiating instruction</td>
</tr>
<tr>
<td>Influence of Attitudes BUD = secure funding, budget</td>
<td>MO = motivation and momentum of initiative</td>
</tr>
</tbody>
</table>

Parent Codes:
- **B = Blog**
- **E = Email**
- **G = Google Apps**
- **I = iPad/tablet**
- **L = Laptop**
- **PP = PowerPoint**
- **SM = Social Media**
- **SP = Smart Phone**
- **T = Twitter**
- **W = Word Processing/Newsletters**
- **COL = for collaboration**
- **COM = for communication**
- **EV = for evaluation**
- **PD = for professional development**
- **CCCR = for college and career ready**
- **CE = to be cutting edge**
- **DI = for differentiating instruction**
- **IT = as tool for instruction**
- **TO = as tool for time and organization**
- **PD = provide professional development**
- **SUS = Sustain the current direction**
## Appendix L: Infrastructure Code Dictionary

<table>
<thead>
<tr>
<th>Topic</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Device Cost</td>
<td>How much the device cost was a factor in it’s selection</td>
</tr>
<tr>
<td></td>
<td>Device Reliability</td>
<td>The reliability of the device was a factor in it’s selection</td>
</tr>
<tr>
<td></td>
<td>Device Brand Reputation</td>
<td>The reputation of the device manufacturer was a factor in it’s selection</td>
</tr>
<tr>
<td></td>
<td>Device Capabilities</td>
<td>The software and/or hardware capabilities (apps, keyboard, photo/video, memory) were a factor in it’s selection</td>
</tr>
<tr>
<td></td>
<td>Device Compatibility</td>
<td>The compatibility of the device with existing district technology or faculty knowledge was a factor in it’s selection</td>
</tr>
<tr>
<td></td>
<td>Device Battery Life</td>
<td>How long the battery would last when fully charged was a factor in it’s selection</td>
</tr>
<tr>
<td></td>
<td>Wi-Fi Reliability</td>
<td>The reliability of the Wi-Fi network was considered when making infrastructure decisions</td>
</tr>
</tbody>
</table>

| 2.    | Sustainability | The ability to financially sustain the initiative was considered in the planning. |
|       | Equity | Making sure that all students would have a device of equal capabilities was a factor |
|       | Parental Support | Parental support was a factor when considering how to fund the initiative |
|       | School Committee Support | School committee support was a factor when considering how to fund the initiative |
|       | School Fund Opportunity | School funds for the initiative were available due to budget conditions or a building project |
|       | Technology Staffing | The capacity of the technology staff to support the initiative was a factor |

| 3.    | Device | The device chosen is perceived to have had an impact on the acceptance of the initiative |
|       | Funding | The funding design is perceived to have had an impact on the acceptance of the initiative |
|       | Wi-Fi | The reliability of the Wi-Fi network is perceived to have had an impact on the acceptance of the initiative |
|       | Technology Staffing | The capacity of the technology staff is perceived to have had an impact on the acceptance of the initiative |
### Appendix M: PLC - Initial Set of Provisional Start-List Codes

<table>
<thead>
<tr>
<th>PLC construct</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Mission, vision, values/Shared work</td>
<td>Shared understanding of the goals the group is working on for the school and their part in achieving the goal.</td>
<td>PLC-MVV</td>
</tr>
<tr>
<td>Collective inquiry</td>
<td>Group regularly reflects on where they are relative to shared goals and progress made toward those goals.</td>
<td>PLC-CI</td>
</tr>
<tr>
<td>Collaborative Teams</td>
<td>PLC educators work together interdependently within collaborative teams to achieve common goals for which they are mutually responsible.</td>
<td>PLC-CT</td>
</tr>
<tr>
<td>Action Orientation/Experimentation</td>
<td>Teams turn learning and insights into action. They recognize the importance of engagement and experience in learning and in testing new ideas.</td>
<td>PLC-AOE</td>
</tr>
<tr>
<td>Continuous Improvement</td>
<td>Members seek better ways to achieve mutual goals and accomplish their fundamental goals.</td>
<td>PLC-CI</td>
</tr>
<tr>
<td>Results Orientation</td>
<td>Teams assess their efforts on the basis of evidence to inform and improve their practice.</td>
<td>PLC-RO</td>
</tr>
<tr>
<td>Shared Time</td>
<td>Time is provided during contractual school day or in a job-embedded fashion for working teams to collaborate.</td>
<td>PLC-ST</td>
</tr>
</tbody>
</table>

### Appendix N: Descriptive Codes Distributed Leadership

<table>
<thead>
<tr>
<th>CODE</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>Concertive Action</td>
<td>Leadership is distributed in a more holistic fashion</td>
</tr>
<tr>
<td>CA-SC</td>
<td>Spontaneous Collaboration</td>
<td>Members with different skill sets (can be across organizational levels) form a team to solve a problem</td>
</tr>
<tr>
<td>CA-IW</td>
<td>Intuitive Working Relations</td>
<td>Members of the team are reliant on each other’s skills and form a close working relationship</td>
</tr>
<tr>
<td>CA-IP</td>
<td>Institutionalized Practices</td>
<td>Organization establishes structures for team members to work together.</td>
</tr>
<tr>
<td>CO</td>
<td>Coordination</td>
<td>Management of tasks</td>
</tr>
<tr>
<td>CO-I</td>
<td>Coordination—Implicit</td>
<td>Task responsibilities clearly written down</td>
</tr>
<tr>
<td>CO-E</td>
<td>Coordination—Explicit</td>
<td>Task responsibilities fall outside clear job responsibilities</td>
</tr>
</tbody>
</table>

### Appendix O: Pattern Codes

<table>
<thead>
<tr>
<th>CODE</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-PATT</td>
<td>Primary Leader</td>
<td>One individual, identified by members of the technology leadership team and/or superintendent for taking primary leadership of the initiative</td>
</tr>
<tr>
<td>S-PATT</td>
<td>Secondary Leader</td>
<td>Additional member of technology team, identified by members of the technology leadership team and/or superintendent as being a vital contributor to the initiative.</td>
</tr>
</tbody>
</table>
### Appendix P: Instructional Vision Interview Questions

#### Research question 1: What is the instructional vision of superintendents who implement large-scale technology initiatives in a 1:1 or BYOD environment?

1. Where did the idea of developing a 1:1 program come from? (policy window/strategic alignment)
2. What factors were considered when determining the design (BYOD, DPD, or blended for the technology initiative)?
3. What is the instructional vision for the district? How was that developed? Please explain.

#### Research question 2: How does the superintendent connect his or her instructional vision with the implementation of technology within the district?

1. Where did the idea of developing a 1:1 program come from? (policy window/strategic alignment)
2. In what areas were you hoping this technology initiative would help your district?
3. Who was involved in the planning & what steps we initially taken? Who did you need to convince to get buy-in and how did you go about this?
4. What and how were decisions made to implement technology infrastructure?
5. What is the vision for technology use in your district and how is that communicated to all stakeholders? Please explain.
6. How does the instructional vision and technology initiative relate to each other?
7. How is the instructional focus communicated out to all stakeholders?
8. How is the instructional vision used to gain acceptance for the technology initiative?
9. Who helps you integrate your technology program?
10. Who worked with teachers relative to implementing this new technology into classrooms?
11. Describe formal or informal structures at plan in the district around educator collaboration.
12. What training, activities, actions or documents helped to ease the implementation of this initiative in your system?
13. How do you communicate district initiatives?
14. How has your use of technology impacted the technology integration in the district?
Research question 3: How do building-level administrators make sense of the superintendent’s instructional vision for technology?

1. Where did the idea of developing a 1:1 program come from? (policy window/strategic alignment)

2. Please describe the technology initiative in its current state.

3. What and how were decisions made to implement technology infrastructure?

4. What is the vision for technology use in your district and how is that communicated to all stakeholders? Please explain.

5. How does the instructional vision and technology initiative relate to each other?

6. How is the instructional focus communicated out to all stakeholders?

7. How is the instructional vision used to gain acceptance for the technology initiative?

8. Who helps you integrate your technology program?

9. Who worked with teachers relative to implementing this new technology into classrooms?

10. Describe structures that exist in the district around educator collaboration.

11. What training, activities, actions or documents helped to ease the implementation of this initiative in your system?

12. How do you communicate district initiatives?

13. How has your use of technology impacted the technology integration in the district?
## Appendix Q: Communicated Instructional Vision of Superintendents and District Administrators

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supt. Brody</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT HS Grace</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIS Rylan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIS Ava</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIS Caitlin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIS Grace</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Net. Mgr. John</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethan MS Princ</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grady MS Princ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## ADAMS

| SUPT. NORMAN                        | X           | X  |        |     |      |        |                |      |    |         |             |             |       |
| Howard Dtech                        |             | X  |        |     |      |        |                |      |    |         |             |             |       |
| Jim TIS                             | X           |    |        |     |      |        |                |      |    |         |             |             |       |
| Paul For HS Princ                   |             |    |        |     |      |        |                |      |    |         |             |             |       |

## JEFFERSON

| SUPT. DAVID                         | X           | X  |        |     |      |        |                |      |    |         |             |             |       |
| Charles HS principal                |             |    |        |     |      |        |                |      |    |         |             |             |       |
| Grace HS Asst. Principal            |             |    |        |     |      |        |                |      |    |         |             |             |       |

## MADISON

| SUPT. BOB                           | X           |    |        |     |      |        |                |      |    |         |             |             |       |
| Brett- For. Dtec                    | X           |    |        |     |      |        |                |      |    |         |             |             |       |
| Rose El princip                     |             |    |        |     |      |        |                |      |    |         |             |             |       |
| Teagan- Dir of Acac                 | X           | X  |        |     |      |        |                |      |    |         |             |             |       |
| Theresa Gr Writ                     |             |    |        |     |      |        |                |      |    |         |             |             |       |

## MONROE

| MONROE Supt                         | X           |    |        |     |      |        |                |      |    |         |             |             |       |
| Meagan Dtech                        | X           |    |        |     |      |        |                |      |    |         |             |             |       |

| 267 |