THE ROLE OF THE STATE EDUCATION AGENCY (SEA) IN INFLUENCING THE

STATEWIDE ADOPTION OF COMPUTER-BASED K12 ACCOUNTABILITY

ASSESSMENTS

By

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ABSTRACT OF THE DISSERTATION

The Role of the State Education Agency (SEA) in Influencing the Statewide Adoption of

Computer-Based K12 Accountability Assessments

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State Education Agencies (SEAs) face challenges to the implementation of computer-based accountability assessments. The change in the accountability assessments from paper-based to computer-based demands action from the states to enable schools and districts to build their technical capacity, train the staff, provide practice opportunities to the students, manage the logistics of testing in the computer labs and provide change management services to all stakeholders including the public. In mandating these assessments, states have a responsibility for building technical, human and social capital to support the technical implementation and for informing the public to ensure student participation. An effort to move to computer-based accountability assessments requires all stakeholders to contribute in order for it to be successful. Understanding the contributions the SEA can make will help states in addressing the challenges to the successful administration of millions of exams.

The study was a mixed method study of the statewide implementation of computer-based accountability assessment in three states. The purpose of this three-state comparative case study was to describe the SEA contributions to the extent of adoption of computer-based assessments for K12 statewide accountability. This study contributes to the literature on how institutional adoption of innovations can be facilitated or hindered by the activities of the governing body of the institution by studying how the actions of the SEA affect the institutional adoption of computer-based accountability assessments as shown by two indicators – technical implementation and student participation. The SEA factors contributing to the successful adoption of computer-based assessments are the procedures and practices at the SEA, interactions between the SEA and the districts, and SEA and local capacities. Because the SEAs can adjust their procedures and practices and their interactions between themselves and the districts, these areas are the focus of this study. By focusing on what the SEA can control in their implementation plans, this study aims to guide SEAs on what they can do to support the successful adoption of computer-based assessments for accountability.

Acknowledgement and Dedication

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CHAPTER 1: INTRODUCTION

Overview of the Problem

State education agencies (SEAs) faced significant challenges to the implementation of the computer-based accountability assessments, especially as a new generation of assessments were developed and funded by 2010 federal Race to the Top grants. Responsible for statewide accountability systems, SEAs experienced difficulties in implementation on many levels: student interfaces, teacher training, school capacity, district collaboration, state management, federal accountability and of course, public perception. Despite the critical role SEAs played in the transition from paper-based tests to computer-based accountability assessments, few studies have explored the factors influencing this adoption. Understanding how SEAs contributed to two key factors—technical implementation and student participation—will help states address the challenges of administering millions of annual computer-based assessments.

In the absence of research-based best practices for the adoption of computer-based accountability assessments, SEAs forged their own approaches to supporting districts and schools. In many cases, best practices developed organically and without a clear understanding of the impact and as a result, organizations like the Council of Chief State School Officers (CCSSO) and Association of Test Publishers (ATP) developed and published Operational Best Practices for Statewide Large-Scale Assessments (CCSSO & ATP, 2013). General practices on change management or reform efforts may be used when other supports may have been more effective. For example, the varied implementation and adoption practices among states affected the national effort to implement the Common Core State Standards (CCSS), consortia-based assessments, and common resources across all states. States needed support in bringing the full cycle of this policy through the transition and implementation of computer-based assessments in practitioner terms, specifically in terms of what the SEA can do to successfully shift from paper

and pencil to computers and how they ensure student participation. Developing a research-based playbook for SEAs on effective implementation practices for computer-based assessments was an overlooked step in this broader policy initiative.

So what does success look like for the institutional adoption of innovation, particularly when the adoption extends to people outside of the organization? And how do you measure success? Traditional adoption models evolved from Everett Rogers research and measure success based on whether or not (1) the innovation was implemented correctly (e.g. Apple's deployment of iTunes as a content management system for users) and (2) users adopted the innovation (e.g. consumers purchased iPhones.) These models are more consumer-oriented than testing in schools and focus on products and services for purchase   Models for institutional adoption measure success by diffusion, meaning how well the innovation was adopted inside the organization. But these models don't measure the participation rate of those outside of the organization.

K12 students are outside the institution (i.e., SEA) and yet they needed to participate in the computer-based assessments for the adoption to be successful. Technical implementation of the accountability assessment systems was not enough to achieve success. The SEA also needed to ensure participation outside the organization, and specifically at the student level.

My purpose and definitions

The purpose of this three-state comparative case study was to understand the role of the SEA in facilitating the statewide adoption of computer-based K12 accountability assessments and how their actions enabled and constrained adoption. This purpose statement is based on Creswell's encouragement to define boundaries and map the study (Creswell & Miller, 2000) and serve as the focal point for the analysis. In complex problems like this one where there are

so many actors, processes and systems, defining boundaries is very important so that the analysis on the role of the SEA can be conducted methodically.

This comparative study is an important addition to the literature because it examined the role of the institution within the K12 educational system that was most accountable for the adoption – the SEA. While other studies were quick to point out what schools and districts should do to prepare for adoption, my study investigated how the SEA affected the adoption of computer-based K12 accountability measures through its policies, procedures and interactions with the districts. Specifically, my study explored how the institutional adoption of innovations can be facilitated or hindered by the activities of the governing body of the institution.

This study also led to the development of a new model for institutional adoptions that affect populations outside of the organization. This conceptual framework, detailed in Chapter 2, includes factors that contribute to the successful adoption of computer-based assessments and indicators of statewide adoption. The factors are what SEAs can control in their implementation plans. The indicators look at both the implementation and the acceptance of the new service. Since SEAs influence the factors, my study also garnered insight for SEAs on what they can do to support the successful adoption of computer-based assessments for accountability.

For the purpose of this study, I used the popular term of "computer-based assessments" to refer to the delivery of tests on computers, netbooks and tablets. Two other terms are sometimes used interchangeably, "technology-enabled assessments" and "online testing", but there are differences. The term "technology-enabled assessments" (TEAs) implies that the assessments could not be delivered without the technology, but in many cases, a state's first experience in moving to computer-based assessments was to use the paper test and simply deliver the same multiple choice items on computers. The term "online testing" implies being connected to the

Internet but most architectural designs for K12 delivery used a cache proxy to mitigate the risks of Internet connectivity.

Another high-level distinction was made between the terms innovation, change and reform. As described by Rogers (2003), an innovation is defined as a practice or a technology that people perceive as new. I referred to innovation as "doing different things". Change is defined as altering an approach or switching out an object in favor of another. I referred to change as "doing things differently". Innovations and changes can be localized and even individualized for adoption. Reform, however, is defined as a large-scale systemic change that may or may not include innovations but certainly includes change. In this research, I focused on innovations and how doing different things could be enabled by a state agency.

Policy Context

A larger policy context surrounds the use of computer-based statewide accountability assessments in K12 schools. This ecosystem includes global competition and career readiness, federal funding for education, the development of national standards and state consortia implementation, SEA support for districts, the technical capacity of schools, and an environment in which students had parent and teacher support to opt out (i.e., refuse to participate) of testing. These elements are described in more detail in the sections that follow.

Background. As described by the U.S. Department of Education in the Race to the Top Assessment Program, to prepare a workforce for the competitive 21st century global economy, the U.S. needed to improve education delivery, increase performance on basic skills, and prepare students for college and/or future careers (U.S. Department of Education, 2009). International rankings, for example, demonstrate this need. On the 2012 Programme for International Student Assessment (PISA), for example, the U.S. ranked 27th in math, 17th in reading and 20th in

science. Among the 34 countries in the Organization for Economic Co-Operation and

Development (OECD), the U.S. ranked 5th in per student expenditures (OECD, 2013).

The development of the Common Core State Standards (CCSS) began in 2009 and

included the critical thinking, analytical, and problem solving skills required for college and

career success. As of February 2017, the standards have been adopted by 42 states (Common

Core State Standards Initiative, 2017). Connected to these standards is the need to assess

knowledge, skills, and abilities that cannot be taught or assessed with paper and a pencil

(Bennett, 2006; Conference Board, Corporate Voices for Working Families, Partnership for 21st

Century Skills, & Society for Human Resource Management, 2006; Dede, 2009; Levy &

Murnane, 2004; Tapscott, 2009; Virginia Department of Education, 2014b). The goal of

problem solving skills, for example, is to understand the techniques and methods students use to

get to an answer, rather than just the answer by itself. Assessing the efficiency and effectiveness

of problem solving can be done when the steps a student takes to solve a problem are tracked—

which computer-based assessments do.

In 2009, when the Obama administration created the Race to the Top (RTTT) program,

the federal government sought to improve academic performance and focus on the development

of CCSS. This program allocated 4.3 billion dollars on education with 360 million of those

funds going to two consortia of states in 2010, Partnership for the Assessment of Readiness for

College and Careers (PARCC) and the Smarter Balanced Assessment Consortium (Smarter

Balanced), for the development and field testing of new assessments based on the CCSS and

delivered by personal computing devices (U.S. Department of Education, 2009).   "These

assessments are intended to play a critical role in educational systems; provide administrators,

educators, parents, and students with the data and information needed to continuously improve

teaching and learning; and help meet the President's goal of restoring, by 2020, the nation's position as the world leader in college graduates" (U.S. Department of Education, 2012b). Support for computer-based assessments based on the new standards continued through the Obama administration. Yet, the question remained as to how best to achieve simultaneous testing of all students in a statewide accountability assessment (Metz, Ginwala & Martin, 2016).

With the move to computer-based testing in 2015, states were also adopting the new consortia assessments and giving up their state-designed assessments based on their state standards. First, the new consortia assessments were a new design based on the work done under the Race to the Top program. These new statewide accountability tests require digital devices (e.g. computers, tablet) for delivery of the interactive tasks to collect data on a student's ability to solve problems relevant to 21st century college and careers readiness skills. This new design could no longer be delivered via paper-based tests and marked a move in education to technology-enabled measurement of knowledge, skills and abilities of our students. Some opposed this techno-centric method being introduced to the classroom while others praised the move to measure 21st century skills. Second, giving up state standards in favor of a set of nationally-developed standards with the Common Core was difficult for some states. Some stakeholders saw this move as giving up some state control over education which was constitutionally granted. Some people viewed this move as a way for the federal government to meddle in state affairs and broaden the federal influence on education. These two dynamics – new assessment design of 21st century skills and conversion from state-based standards and assessments to Common Core standards and consortia assessments – complicated the public views on this move to computer-based testing.

Technical Implementation. Understanding the challenges of implementing computers for statewide testing and the factors helping us overcome these challenges is critical to the successful administration of millions of exams. In 2013, the PARCC consortia acknowledged the challenges of technology capacity and offered a non-computer-delivered option for states needing more time to build capacity (PARCC, 2013). By March 2015, 33 states were members of one of the two consortia, aiming to deliver about 20 million computer-based assessments to students (PARCC, 2014; Smarter Balanced, 2014). Some states began testing on computers over ten years ago while others only started testing on computers in 2014 (Smarter Balanced, 2013). Still other states, only test on their state standards (and not the CCSS) but are committed to increasing the use of computers for testing purposes (Texas Education Agency, 2014).

Across all states, the role of the SEA included supporting districts in the administration of accountability assessments. SEAs developed networks of local test administration staff that were empowered to manage state-based assessments used by the federal government for accountability. Until recently, SEA support was based on the model for testing that has been used since schools began: paper and pencil. When a pencil broke or a paper ripped, the school simply gave the student another one. With the advent of computer-based assessments, this was no longer the case. Support for local districts and schools had to go beyond a replacement pencil and move into the world of technology but many people in the schools were ill-prepared to support it. Assessing the capacity of local resources was more complicated and the schools needed more support than ever, especially during the transition.

The move to computer-based accountability assessments required all stakeholders to contribute in order for it to be successful. In many cases, the CCSS were new state standards and the assessments measured different knowledge, skills and ability that had to be taught in the

classroom before they could be assessed. Teachers became local resources helping to prepare the school and its students for the change. Schools managed this transition by drawing from their experience in changing textbooks or curriculum and integrating new classroom management techniques or instructional approaches. Districts provided technical assistance and helped schools build the inventory of infrastructure and equipment they needed. State administrators offered their vision, support and resources.

The change in the accountability assessments from paper-based to computer-based demanded action from the states to enable schools and districts to build their technical capacity, train staff, provide practice opportunities for students, manage the logistics of testing in the computer labs, and provide change management services to all stakeholders. In mandating these assessments, the SEA had a responsibility for building the technical, human and social capital needed to support the transition through funding, training, technical support, etc. Schools and districts relied on the SEA's help in the state-mandated change to new assessments delivered on computers and this focus on the technical implementation may have caused them to lose touch with what was happening in their communities.

Student Participation. The environment in accountability testing has changed over the last three years. The implementation of computer-based assessments moved toward faster and more complete adoptions. States like California fully converted to computer-based assessments from one year to the next. Initially the politics of policy implementation were not significant and assessments were scheduled and administered as they had been in the past, albeit on computers. But the fast conversion to computers and the politics landscape ignited a backlash that caught the SEAs by surprise.

The political landscape is complicated and delving into the details is beyond the scope of this research; however, in the spring of 2015, when I was conducting interviews for the second and third state, it had a significant impact. Many stakeholders increased their opposition to the new accountability measures as well as the adoption of new standards, the assessment of student outcomes against these standards, and the progression towards the use of student test results to assess teacher quality. While there are many examples of heightened activism, increased public awareness, and changing perceptions, I will highlight a few.

Parents and students. Many parents and students became activists in opposing the PARCC and Smarter Balanced assessments based on CCSS. In New York, for example, the opt-out movement saw an increase in support. This movement advocated for parents to permit their child(ren) not to take the statewide accountability assessments. "At least 165,000 children, or one of every six eligible students, sat out at least one of the two standardized tests this year, more than double and possibly triple the number who did so in 2014, according to an analysis by The New York Times" (Harris & Fessenden, 2015). Notably, students in upper grades opted out at higher rates than those in lower grades.

Educators. Teachers actively campaigned against these standardized assessments as well, expressing concerns for the loss of class time, the integration of the new standards and curricula into their current practices, and the effect of the test results on their own performance reviews. In New Jersey, the teachers' union, New Jersey Education Association (NJEA), became active in the anti-testing movement with a public advertising campaign. "Parents are fed up, and they're ready to speak up," explained NJEA President Wendell Steinhauer. "This ad campaign gives parents and teachers a voice in a debate that's been dominated for too long by people with no connection to what's really happening in classrooms today" (NJEA, 2015). In

one video entitled Detrimental, a teacher stated, "Standardized testing is sucking the air out of the classrooms."

States. Some states provided little clarity to local administrative staffs as to how to handle the public outcry and the protests against testing.   For example, one SEA issued a memo to school administrators, principals, testing coordinators and charter school leads that suggested since the tests were state-mandated, the schools should review their discipline and attendance policies to address students who opt out of testing but then softened their position at a public meeting to say that students opting out were not automatically disciplinary problems. This lack of clarity resulted in inconsistent district policies for how to manage students not being tested and poor public opinion of the management of these changes.

My study and this paper.

My state-level comparative case study of three states used information collected from the SEA and the districts to understand the level of adoption and the SEA contribution. Apart from surveys of school capacity, little research has been done to understand the myriad of factors contributing to the success or failure of the adoption of computer-based assessments (Anderson, Harrison, Lewis, & Regional Educational, 2012; McGuinn, 2012). My research suggests that the SEA, which is accountable for the implementation of accountability assessments, can affect the success of the adoption of the new medium even though the districts are responsible for much of the work necessary to prepare the schools, teachers and students. Understanding the SEA and district perceptions of the level of difficulty with implementation and to what extent the districts were satisfied with the SEA throughout the process was the core of my research. Additionally, because the quality of implementation became increasingly more important in the public eye during the time of my study, integrating the notion of "goodness" or "ease" of adoption as a continuum was also useful.

In what follows, *Chapter 2: Conceptual Framework* draws from the literature and provides a new conceptual framework for institutional adoption of innovations, specifically for the K12 adoption of computer-based accountability assessments. A set of research questions based on the literature review are also outlined. The third chapter explains the methodology used for this three-state study. The findings in the fourth chapter show the reader the results of my work within each state and a comparison across all three states. In the final chapter, I synthesize the findings and propose new areas of research.

CHAPTER 2: FRAMEWORK

Introduction

My conceptual framework considered innovation adoption from two separate models and sets of research: (a) the organizational implementation of change; and (b) the individual choices people make to participate in the change. In an organizational model, the governing body dictates a change, and the implementation follows a hierarchical decision-making process, leading members of the institution to a new normal. Relevant research considered change management, leadership and implementation. In the individual model, innovation adoption research focused on individual decision-making and the diffusion of an innovation through a population. But in my work with SEAs and the adoption of K12 computer-based accountability assessments, neither model was sufficient. So I developed a model for when an organization must implement the innovation AND convince the community to participate in order for the adoption to be successful.

A different lens is needed for diffusion and adoption when considering the institution of public education. The hierarchy for statewide accountability assessments starts with the SEA as the governing body and flows down to the school and its teachers and administrators. These local actors strive to fulfill the programs set up by the SEA. These local actors also are accountable to the school community, including students, parents and the general public. With statewide computer-based assessments, the SEA perceived participation of the community as mandatory but the local actors bore the brunt of the school community's resistance to this change. The local actors were conflicted as to whether to support their organization (i.e., what the SEA wanted to do) or their community (i.e., what the students and parents, and sometimes teachers, did not want to do.) This led me to question how a public education institution can

implement a mandated innovation in a way that the public both adopts it and chooses to participate in it.

In this study, I sought to understand how hierarchical institutions (i.e., SEAs) can influence the adoption of an innovation and participation in the services offered. The latter is not expected to cause problems when the service is mandatory, but in my work, it did. My research revealed two loosely coupled aspects of innovation adoption of computer-based K12 accountability assessments: a) the technical implementation where the organization provides the new services; and b) the participation of the recipients in the new services. Participation by non-organizational members (i.e., school community) was lower than expected. In my work, the technical implementation of computer-based assessments went well but unprecedented numbers of students opted out of the mandatory assessments, refusing to participate.

In this chapter, I explore the literature on innovation adoption, implementation and participation. I address policy implementation, capacity building, leadership and influencers of adoption. This research guided the development of my conceptual framework and four research questions in my examination of how an SEA can influence the successful adoption of innovation through its policies, administrative procedures, management, and interactions with stakeholders. My research questions include:

- How do the procedures and practices at the SEA influence adoption?

- How do SEA-district interactions influence adoption?

- How do SEA and local capacities affect adoption?

- How do environmental factors influence adoption?

Having a better understanding of the factors affecting the adoption of complex technology innovations will facilitate better policy implementation in the future.

What is innovation adoption?

Innovation adoption is a decision to take advantage of something new. Researchers on innovation adoption typically base their models on the groundbreaking 1962 book, <u>Diffusion of Innovations</u> by Everett Rogers. This work advanced the notion that people choose to participate in adoption and subsequently fall into categories of adopters, from innovators to laggards. Figure 2.1 illustrates Rogers's innovation theory (2003) and the curve of adopters.
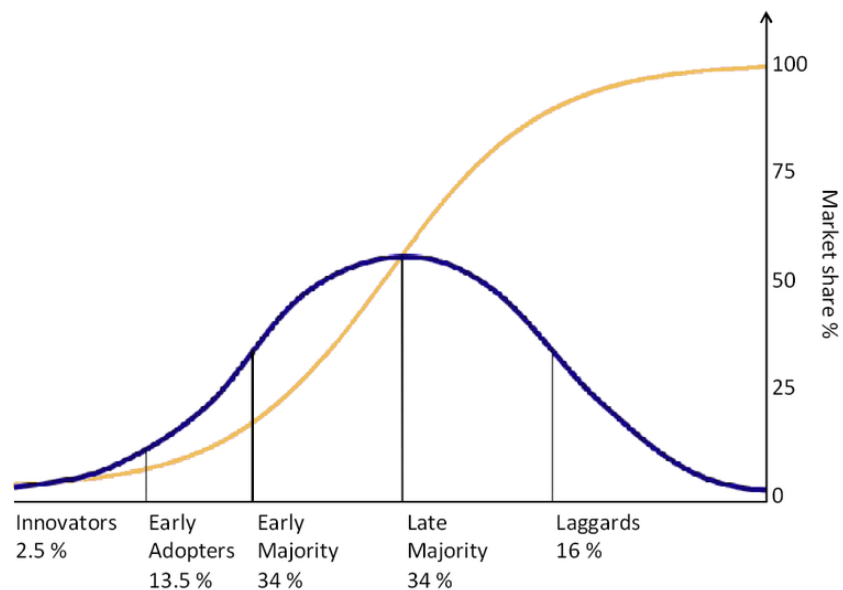
Figure 2.1. Adopter Categorization on the Basis of Innovativeness as defined by Rogers (2003, p.281) showing the five adopter categories: innovators; early adopters; early majority; late majority; laggards.

The literature also distinguished the concepts of adoption, innovation, unit of adoption, technology, and local actors. These concepts can be applied to individual or institutional adoption of innovations and are defined as follows:

- Adoption is a "decision to make full use of an innovation" (Rogers, 2003, p.177).

- Innovation is "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p.12); characteristics of an innovation include relative advantage, compatibility, complexity, trialability and observability.

- Unit of adoption is the person(s) adopting the innovation where the decision is made individually, as a collective (i.e. consensus of a group) or authoritatively; five adopter categories for units of adoption are innovators, early adopters, early majority, late majority and laggards (Rogers, 2003, p.270).

- Technology is a "design for instrumental action that reduces the uncertainty… in achieving a desired outcome" (Rogers, 2003, p.13); characteristics include hardware and software components and technology clusters that group interrelated technological components to improve the adoption.

- Local actors are the individuals or groups that affect the adopt decisions or implementation.

By the mid-1970s, research on innovations in organizations began to focus more on the diffusion of adoption within an organization. While Rogers' (1962) model is often used by consumer technology companies to explain the rate of adoption of products and services, it fell short of framing the diffusion of technologies in an institution. Over time researchers discovered that an organization did not always hinder adoptions and common perceptions as to the difficulty in "*turning the ship*" to adopt new ideas was not always the case. In fact, despite the stability of organizational behavior, innovations still occurred. This new understanding pivoted the research to focus on the innovation process within an organization and on its two sub-processes: initiation and implementation (Rogers, 2003).

Many researchers used the research from Rogers (2003) to understand how innovations are adopted by individuals and institutions. In the field of education, Moore (1991) and Christensen, Horn and Johnson (2008) built off Rogers' (2003) framework to describe a chasm between the early adopters and the early majority due to the risk-averse culture. Fullan (2001) further explained how schools often experience an "innovation dip," defined as a decrease in performance and confidence when implementing an innovation requiring new skills and knowledge. This dip, Fullan explained, is due to two primary factors: (a) the fear of change; and (b) the lack of knowledge or skills to make the implementation a success. During school reform efforts, districts often report a loss of productivity, issues of teacher quality, and distractions from the political climate (Malen & Rice, 2004; McGuinn, 2012; Mintrom, 1997). As Fowler observed, "Change is hard and the status quo is comfortable." (Fowler, 2013, p.244). The willingness of the participants to make an innovation successful is as critical as the knowledge and skills they possess.

Drawing from this work and Rogers' (2003) innovation theory, I applied the definitions of innovation, technology and adoption to the K12 accountability testing transition from paper- to computer-based medium:

- The adoption is statewide implementation of K12 accountability assessments.
- The innovation is the use of computer-based accountability assessments measuring 21st century skills.
- The unit of adoption for the student participation indicator is the student and for the technical implementation indicator is a district.
- The technology cluster is the new content of the assessment coupled with test administration software and the computing devices.

Using these definitions to study the changes in medium for K12 accountability testing allowed me to apply factors of innovation theory to my conceptual framework. However, defining local actors was a challenge in this work. Who are the local actors in the statewide adoption of computer-based assessments? Students? Teachers? Fullan (2007) offered this perspective when describing the role of students in educational change: "People think of students as the potential beneficiaries of change… They rarely think of students as *participants* in a process of change. Consequently, there is limited evidence regarding what students think about changes and their role regarding them" (p. 15). At the same time, teachers and school administrators are in two conflicting local actor roles. They are local actors in the organization responsible for implementation AND local actors resisting the adoption. They played both roles in 2015.

The organization is responsible for the technical implementation.

To implement changes, an individual or an institution defines the change and carries out that change. Effective public policy implementation depends on a solid research basis, clear guidelines, good leadership, legislative support and public support (Odden, 1991; Sabatier & Mazmanian, 1979). Technical implementation is carried out by an organization based on research and best practices in policy implementation, capacity building and leadership. These areas of research are explored in the next few sections.

Policy implementation. In the institutional implementation of innovations, central authorities make policy decisions to which local actors need to adhere, despite system complexities and arising issues. At times, not all data are known while the optimization of resources is the primary goal. Such policy decisions are often based on balancing the needs of different groups for the good of the society. In the case of educational testing, competing groups see different benefits from the adoption of the new tests: (a) technologists and economists see

benefit from the evaluation of the 21st century skills; (b) taxpayers often gain a measure of school and teacher performance; (c) students in poor-performing schools may benefit from the increased attention; and (d) students in high-performing schools gain bragging rights. Research reveals that these benefits, or competing goods, drive those in power to make a decision of one idea over another for the best utility (Green, 1994) and the outcomes may be one that no one person wanted, adapted in response to events in the environment (Browne & Wildavsky, 1983; Majone & Wildavsky, 1979).

For technology-related policies, policymakers need consider the constraints on the entire system, including human resources, operational processes, and technical infrastructure needed for the innovation to be used efficiently and effectively. As described by Rogers (2003), authority innovation decisions are made in a hierarchical organization by those "who possess power, status or technical expertise" (p.29). The members of the organization are not involved in the innovation decision but are expected to implement the decision once made.

In education, policymakers are not typically experts in technology and face challenges in planning resources, processes, and infrastructure. Relevant studies show that when education policymakers did not understand the infrastructure needed, the adoption of the technology was either unsuccessful or at too low of a rate to make a meaningful difference for students (Dean & Martineau, 2012; Glazer & Peurach, 2013; McDonnell & Elmore, 1986; McGuinn, 2012; Rothman, 2011). As our world becomes more technologically sophisticated, education policymakers need to keep pace with these changes to ensure the proper review of the research, development of guidelines, digital leadership, and support from the governing bodies and the public.

Building capacity. Capacity is defined by Spillane and Thomson (1998) and Rogers (2003) as having three factors: human capital, social capital and financial resources. Accordingly, the planning of the statewide adoption of computer-based assessments should forecast local technology readiness, financial resources, curriculum alignment to Common Core State Standards, and local control for decisions (Dean & Martineau, 2012; Penuel, Frank & Krause, 2010). Investing money in the technology (i.e. financial resources), investing time in training local actors (i.e. human capital) and allowing local networking and decision control (i.e. social capital) can increase capacity.

Technology. The U.S. Department of Education recognizes three major points around technological capacity: (a) the lack of technology readiness in the schools; (b) the need to let schools choose their technology solutions given they must procure them; and (c) the need for local staff support in the schools. All of these points align well with the Spillane and Thomson model. The need for human resources to support technology is one of the four top challenges cited in the U.S. Department of Education's first year report about local technology capacity for the Race to the Top assessments:

> A challenge for PARCC member states will be to increase districts' and schools' technological capacity. This is vital for ensuring students learn the 21st century skills they need to be successful in college or the workforce. In addition, districts and schools will need expanded capacity for them to be prepared to administer the computer-based assessment system in the 2014-2015 school year. Improving and increasing technology in schools and districts is a larger issue than for the development of the consortium's assessment system, but the consortium must play a key role to support member states. (U.S. Department of Education, 2012a)

Local capacity affects how successful a school or district can be at innovation adoption. Building capacity oftentimes falls in the hands of the implementation team, which can provide coaching and affiliative activities such as interactive training sessions and online communities, especially for the early adopters (Fullan 2001). In the case of K12 computer-based accountability assessments, this team typically includes a state contractor who supports the state, districts and schools. In the typical scenario, this support from the state contractor, responsible for the test administration, is particularly important for computer-based assessments because the testing company supports the delivery system and produces the documentation made available to the local resources for set-up and troubleshooting (Pearson Education, 2014; Educational Testing Service, 2014).

Local actors. Rogers (2003) described the willingness of local actors to adopt institutional innovations as having an influence on how well the innovation is adopted. Research suggests teachers (i.e., local actors) integrated innovations and new approaches into their practice when they regularly interacted with other practitioners and experts (Coburn, Choi & Mata, 2010; Dean & Martineau, 2012; Firestone et al, 2005; Penuel et al, 2010). Applying this research to my study's case of the transition to computer-based accountability assessments, teachers could help make the change successful if they were to use more computer-based activities, teach their students the material to be tested, and help them build confidence in their test taking. Such practical activities, procedures and practices can influence adoption by supporting (or not) the local actors and stakeholders involved in the change.

Local networking and decision control. Social networks facilitate or impede the diffusion of innovation across a community through formal and informal communications and social relationships (Rogers, 2003). This interaction at the local level is important for sharing

information and experience. As Daly (2010) described, strong ties are associated with initiating and sustaining successful large-scale change efforts, and stable ties between sub-groups facilitate knowledge transfer, cooperative relationships and the exchange of novel information. Social networks have characteristics (e.g. centrality, density and network fragmentation) representing the relational understanding between stakeholders and influencers which can affect the rate of adoption and the effectiveness of the change. Networks can be internal or external. They can also be instrumental (goal-oriented) or expressive (personal) with diffusion effects from neighboring networks (e.g. states). The central and peripheral actors include entrepreneurs with their semi-structured teams, governmental and non-governmental individuals and groups (Daly & Finnigan, 2010; Mintrom, 1997; Mintrom & Norman, 2009; Mintrom & Vergari, 1998; Song & Miskel, 2005; Song & Miskel, 2007). Research indicates that when these interactions are positive, they provide a supportive environment for leadership and the local actors during the change.

Leadership. Leadership is important during change, both in the beginning for the launch as well as throughout the life of the project. Leadership is needed to provide a consistent vision, communication, and resources to achieve the goals. Because education systems are categorized as loosely coupled organizations, they require systemic change management that treats change like a process and not an event (Hall & Hord, 2006). This loose coupling is driven by state control of certain aspects of education (e.g., state standards) and local control of hiring, facilities, and budgets, among others.

In change management, Kezar (2005) describes three stages. In the first stage, building commitment is critical to understand the universe of stakeholders. Leaders need to see the level of influence and the strength of the informal network so they can develop a plan for building a

shared vision for the change. The second stage is for gaining this commitment, which Kezar argues should be in the context of the institutional mission and not only for those at the top of the hierarchy. As Fullan (2001) also reminds us, people in the organization want to understand how their work fits into the larger mission. All actors need to see the effect of their contribution on the change which is critical to institutionalizing the change. The final stage is to sustain the vision. Here, the institution should actively develop the operational support for these changes, including people, process and technology.

Research indicates that SEA staff members seek information from both internal and external resources, communicating with a variety of actors to gain knowledge about changes (Anderson et al, 2012; Masell et al, 2012). This knowledge creation and sharing are critical elements of leadership needed to support change (Fullan, 2001). These behaviors foster enthusiasm, hope and energy so that members of the community make a commitment to the change.

The politics affect adoption by affecting student participation

The public can choose to take part in the implementation of a change and can benefit from the services provided. Educational reform is often affected by public opinion and it relies on individual participation. As described earlier, students, teachers and other local actors need to participate in order for the reform to be successful. Innovation theory provides a conceptual description of how individuals adopt a change but in practice, public policy implementation is affected by other influences on the individuals' decisions to participate in the change.

Influencers of adoption in education. As a public service, education is influenced by factors outside of the schools. National and state policy can shape the programs funded and supported by federal or state dollars. The public, as taxpayers, have a say in the public policies affecting education and often use this right as customers and watchdogs of the public service. At

times, the public advocates for a particular group or community which can cause conflict and influence the adoption of innovations.

National policy. National policies such as the Elementary and Secondary Education Act (ESEA) and more specifically the Race to the Top Assessment (RTTA) program affect state policies such as standards adoption with Common Core State Standards. Federal funding was awarded for the development of these standards and the replacement of individual state standards. The ongoing federal funding of states to increase their academic performance encouraged states to adopt the computer-based assessments from RTTA in place of their mostly paper-based assessments (Fowler, 2013; McDermott, 2011; McGuinn, 2012).

Research also indicates that politicians use four levers to move innovations through policy development: mandating laws and requirements; restructuring governance or financing; developing skills through training; and funding activities for change (McDonnell & Elmore, 1987). Flexibility Waivers are an example of how these levers were used nationally to affect change in the states. In 2013, a reduction in federal funding was expected for schools that did not make Adequate Yearly Progress as defined in the ESEA's No Child Left Behind (NCLB). But the Obama administration allowed for Flexibility Waivers for states filing plans to increase academic performance. One state in particular used this flexibility to submit a plan for measurable, achievable objectives using their own state standards. This plan combined a number of distinct initiatives already underway, or recently proposed, and integrated the NCLB requirement for subgroup reporting – this subgroup reporting was focused on ensuring accurate measurement of the gaps between students in low-performing schools and their peers in the highest-performing schools (citation redacted [1]). Other states filed for the waivers also showing how the national policies affect their state policies.

State policy. State policies affected the adoption of computer-based accountability assessments in multiple ways, including the state's expertise and policymaking, standards and accountability, assessment policies, and systematic changes in state operations. Standards reform, begun in the 1980s, led to better student performance on accountability assessments, and states were rewarded with higher student performance if they adopted, clearly communicated and implemented accountability measures (Bishop, 1997; Carnoy & Loeb, 2002; Firestone, Fuhrman & Kirst, 1989). State assessment policies need to account for state funding of SEA and local capacity, balancing how aggressive a state can be on its timelines for implementation against compliance with federal accountability (Anderson et al, 2012; Fowler, 2013). Years later, the systematic changes in NCLB state-based reform operations were complicated by district-based decisions on effective allocation of technical and funding resources, leadership development and accountability (Baker, 2003; Daly & Finnigan, 2010; Louis, 2008).

State policy also affected the test design given the use of new measures. The state's test design with its innovations in content and new constructs had a direct effect on the medium for implementation as states looked to assess 21st century skills with the CCSS instead of their own state standards (Anderson et al, 2012). Test design also impacted the ability of students to practice and the accessibility of the systems, especially given state requirements to account for stakeholder interests and concerns. These test design specifications also dictated operational constraints for the implementation by the SEA, districts and schools.

The public. Parents and the public (e.g., traditional education policy influencers such as teacher unions, and business or policy interest groups) can have a great influence on the adoption of innovations in education. In one study, the National Education Association, National Council of Teachers of Mathematics, National Council of Teachers of English as well as a subset of 567

textbook publishers and education organizations were indicated as significant influencers (Rowan, 2002). One approach focused on "following the money" to see how school improvement decisions were made. Another approach was to raise awareness of the policy issue by sponsoring advertising, enlisting celebrities for support, or engaging with communities (McDaniel, Sims & Miskel, 2001). Through these types of activities, parents and the public can help the adoption of the policy without direct involvement in the policymaking.

Actions taken by parents and other stakeholders can also have a significant negative impact on the adoption of innovations. Often stakeholders are working together to support or protest issues that are tangential to the innovation, but the innovation has acted like a lightning rod for public response. A particularly relevant example for my study is the opt-out movement which gained significant traction during the spring 2015 administration of consortia-based tests (Supovitz, Stephens, Kubelka, McGuinn & Ingersoll, 2015). Bennett (2016) describes how factors, including the demographics of those refusing to test and time spent on testing, motivated the opt-out movement and reduced public support for K12 testing:

> Many reasons are given for parents' actions but among the more common are the amount of instructional time lost to test preparation and administration, the educational irrelevance of "bubble tests," the difficulty of new standards and assessments, the pressure placed on students and educators to perform, and the belief that the Common Core State Standards (CCSS) and tests are instruments of corporate-driven reform directed at privatizing education… opt out is a complicated, politically charged issue made more so by its social class and racial/ethnic associations. It is also an issue that appears to be as much about test use as about tests themselves. While the majority of the

public opposes opt out, the minority that supports it is sizable, organized, vocal, and

politically effective. (Bennett, 2016, p.1 and 9)

Local actors. As described earlier, teachers and school administrators are local actors

both within the organization and outside the organization. As members of the public education

system, they are accountable for the implementation of computer-based accountability

assessments and as individuals they are accountable to their community. In 2015, teachers and

administrators often supported the opt-out movement in their schools, especially in states like

New York where teacher evaluations were tied to student performance (Supovitz et al, 2016;

Bennett, 2016).

Conceptual Framework

My conceptual framework focuses on the implementation of the change in medium from

paper to computing devices for statewide accountability tests. As detailed in this chapter,

national and state policies, politics, and SEA factors all affect each other. The SEA factors

include the procedures and practices at the SEA, the interactions between the SEA and districts,

and the SEA capacity building. The dependent variable is the extent of statewide adoption of

computer-based assessments with two indicators—student participation and technical

implementation—and intervening district factors of local politics and school capacity. Figure 2.2

illustrates my conceptual framework. The interactions between the variables are drawn with

double-headed arrows since in this generic model, the effects can flow in either direction (e.g.

national and state policies affect politics and politics affects policies).

Figure 2.2. My conceptual framework is for the role of the SEA in influencing the statewide adoption of K12 computer-based accountability assessments. There are three factors under the SEA control and two indicators of statewide adoption – the technical implementation as well as the extent of student participation.

Each box of the framework contains issues in the statewide adoption of computer-based accountability assessments. "National and state policies" includes federal accountability, state funding, state directives for online testing, the use of Common Core Standards, test design (including accessibility), the use of test for high school exit exams, and the support of the consortia. "SEA Procedures and Practices" includes contractor support, documentation, independent research, and leadership. "SEA-District Interactions" includes both formal and informal training and communications. "SEA Capacity Building" includes teacher technical support, school IT infrastructure and computer availability, operational scheduling, and the migration path from paper to computer. "Politics" includes issues involving students, parents and the public. Each of these boxes affects the extent of statewide adoption as measured by two indicators: "Student Participation" and "Technical Implementation."

Research Questions

How do the procedures and practices at the SEA influence adoption?

This first research question asks how the SEA-defined implementation procedures and practices affect the ability of local districts and schools to be successful in the rollout of computer-based accountability assessments. The SEA sets the direction and the goals. It provides information and the mechanism for implementation of the computer-based assessments through the development and distribution of documentation, access to the state contractor, and SEA leadership. These procedures and practices at the SEA can facilitate or impede the adoption of an innovation. The SEA's ability to lead the change and communicate with all stakeholders can affect how well the change is adopted.

How do SEA-district interactions influence adoption?

This second research question asks how the interactions between the staffs of the SEA and districts affect the adoption of computer-based assessments, including support for the activities of the district testing directors and perceptions of cross-organizational effectiveness. The interactions between the SEA and the district include the training, communications, and support offered to districts in preparing for and administering the tests and providing a culture of decision-making and local authority to optimize the operations.

How do SEA and local capacities affect adoption?

The third research question considers the effects the SEA, district and school capacities have on the extent of adoption. Capacity at the SEA influences the effectiveness and frequency of the interactions with districts and schools. Expertise and resources are allocated to assessment operations for summative and formative computer-based and paper-based assessments. Staffs of varied backgrounds need to support districts and schools during the transition from paper- to

computer-based assessments using technical knowledge, social capital, classroom familiarity, and administrative experience, among others.

How do environmental factors influence adoption?

The fourth and final research question considers the effect independent environmental variables of national and state policies, the design of the tests including their accessibility, and parents and the public (e.g. the opt-out movement) have on the mediating variables of capacity, procedures and practices.

CHAPTER 3: EVALUATION METHOD

My three-state study enabled a state-based comparison of SEA effects on the adoption of computer-based assessments for accountability. The study was a mixed method study of the statewide implementation of computer-based accountability assessments in three states. In this chapter, I describe the methodology for my research study. First, I describe the policy context and the methods used to select the three participating states. Specifically, I outline the state sampling process as well as selection of SEA leaders and district testing directors. Next, I describe data collection, including the instruments I used (i.e., interview and survey), and procedures for data reduction, analysis, and interpretation. Finally, I close the chapter with the limitations of the study and my role as a researcher.

Policy Context

As described more fully in Chapter 1, the political environment for educational assessments, and student accountability assessments in particular, was a controversial place in spring 2015 when I was conducting my research. This directly impacted the purposeful selection of two states and led to modifications of both the interview and survey questions. Many consortia states upgraded their standards, assessments, graduation requirements and teacher evaluations at the same time and struggled to keep all stakeholders well-informed. SEAs continued to support their districts as they had in the past and encouraged the development of technical capacity in the schools. But political objections to the federal involvement in standards and assessments and the state use of student results for teacher evaluations, emboldened parents and teachers to support students in their refusal to test.

Methods

Between 2013 and 2016, state interviews were conducted with three SEA administrators to determine how the SEA affected the adoption of statewide computer-based accountability

assessments. A survey of district testing directors was conducted to collect data on their perceptions of what contributed to the successful adoption of computer-based accountability assessments. The purpose of the survey was to triangulate the data from the interviews and confirm whether or not the perspectives of the district testing directors were similar to those of the SEA staff members.

The conceptual framework shown in Chapter 2, provided a model for how we can understand a conceptual problem and the consequences of a series of actions (Booth, Columb & Williams, 2008). This framework helped to organize the data collected and the analysis procedures so that the problem could be explained along with the conclusions. The organization of data was consistent with the study goal of describing the SEA factors affecting the extent of adoption of computer-based assessments for K12 accountability, as mapped to the conceptual framework. Each interview and survey question was also mapped back to a research question as shown in Appendices A and B.

The conceptual framework introduces two indicators of adoption, technical implementation and student participation. My measure of technical implementation is the ability for students (those who do not opt out) to participate in the testing. This means there are no outages of the systems, no lack of capacity that drives constraints to participation, no need for districts to cancel and reschedule testing for technical or operational reasons. Data on these issues are collected through public documents. My measure of student participation is the percentage of students who test. These data are collected from public documents, specifically the state accountability assessment reports posted annually on the SEA websites.

Sample selection

In selecting the participants for this study, the first step was to select the states that would be good candidates. After selecting my first state, I used a set of selection criteria to choose the

other two states. The next step was to find the appropriate set of three interviewees on the staff

of the SEA. I researched the lead person at the agency, who in turn proposed the other

interviewees. Finally, the district testing directors were identified by SEA staff, or public

sources. I invited them via email to be survey participants.

   State sampling. My first state was a non-consortia state completing the rollout of their

computer-based assessments. When considering the pool of states for my state sample selection

for my second and third states, I considered the options from which states were choosing in

2015. Some were making no changes to the medium for assessment delivery (i.e. continuing

with paper- or computer-based), thus experiencing no innovation adoption and were eliminated

from the pool. The states left were those moving from paper-based to computer-based

assessments.   Based on my research of public documents, states making this change were also

adopting the consortia assessments. There were no states converting their state-specific (non-

consortia) test from paper to computer at that time. So the consortia states became my sample

pool for selecting my second and third states.

   In this sample pool, states were moving from paper- to computer-based tests while also

adopting a new consortia assessment based on Common Core State Standards rather than state-

based standards. These states were contending with technology implementation in the move to

computers and student participation challenges that were fueled in part by protests to the

Common Core Standards. This study considers these two indicators of adoption to account for

this complex innovation adoption. From this sample pool, four criteria were used to select the

states: a) state experience with the consortia; b) demographics; c) state involvement with

PARCC or Smarter Balanced; and d) political landscape.

Experience with the consortia. Of the three states selected for my study, I selected the first state because it was not affiliated with either consortium and had ten years of experience in computer-based assessments for accountability. The SEA made a long-term plan for the statewide adoption of this innovation, and districts within this state migrated to computer-based assessments during that time. The state set its own timeline and built capacity in order to have a successful computer-based administration of accountability assessments. It had the benefit of time and control over the adoption process.

I selected the next two states because they represented the environment in which states were moving quickly to the consortia-based computer-based assessments which measure college and career readiness, including, for example, PARCC and Smarter Balanced assessments. In spring 2015, 29 states were participating in the two major consortia; PARCC had 11 participating states (plus D.C.) and Smarter Balanced had 18 member states (plus the U.S. Virgin Islands). The SEAs for these states made short-term plans to quickly assess their capacity and address any inadequacies that existed.

Given the above, I used the following criteria to eliminate states from the sample pool. I eliminated four states that did not administer PARCC or Smarter Balanced assessments to all grades for which assessments were developed in spring 2015, bringing my pool down to 25. Next, I eliminated four Smarter Balanced states because they used different vendors when compared to the other ten Smarter Balanced states who used the same contractor for the test administration. The remaining 21 states—11 for PARCC and 10 for Smarter Balanced—were further evaluated to bring the sample size down to about five states for each consortia. From there, I recruited one state that administered PARCC and one state that administered Smarter Balanced assessments.

Demographics. The criteria for state selection were designed to ensure that the second and third state were representative of states in general so as to avoid outlier experiences. Four criteria were considered:

1. Size of state

2. State rank in education

3. Diversity of student population

4. State expenditure per student

I considered the size of the state (e.g., very small states were not representative of large-scale administration challenges) and the state rank in education (e.g., a very low rating indicated possible capacity issues or other significant factors not considered in this study). I then collected additional demographic data from the Institute for Educational Statistics National Center for Education Statistics (NCES) using the Data Explorer for the public website. I used the NCES data and made calculations to compare states—mostly converting student counts and revenues to percentages. Focusing on the diversity of the student population and state financial data, I evaluated each of the 21 states for their suitability for the sample, examining first the PARCC states and then the Smarter Balanced states.

I used "My description" to show that these were derived numbers. These are listed in Table 3.1 where the left column includes the descriptors that I defined and the right column includes the data labels for the NCES data. The NCES and my derived data can be found in the Appendix D for the states that were not eliminated from the sample.

Table 3.1

State demographic data labels

My Description	Calculated from NCES Data
White state population	"Race – White Alone" divided by "Race – Total".
Pupil/Teacher Ratio	"Pupil/Teacher Ratio"
White student population	"Total Students- White" divided by "Total Students"
EL	"LEP/ELL Students" divided by "Total Students"
$ per student	"Total Expenditures for Education" divided by "Total Students"
Revenue from federal	"Federal Revenues" divided by "Total Revenues"
% diff btw total and student whiteness	"White state population" minus "White student population"
full price lunch of total student population	subtracting "Free Lunch Eligible" and "Reduced-price Lunch Eligible" from "Total Students" and dividing by "Total Students"
free lunch of total student population	"Free Lunch Eligible" divided by "Total Students"
IEP of total	"Individualized Education Program" divided by "Total Students"

State involvement with PARCC. In spring 2015, ten PARCC states and the New York City public school district administered PARCC on computers in all grades with developed assessments. I eliminated one state because it was small and not representative of the issues of large-scale administration. I eliminated two states because of statistics that could disproportionally affect capacity: one had a very low rank in education and low per student expenditure; the other, a disproportionately young minority population.

The remaining seven potential PARCC states were divided into two groups. The top group of states had no large-scale computer-based accountability assessment experience, high ranks in education, diverse student populations (i.e., representative of and consistent with the diversity of the total population), near average EL populations, and below average federal contributions to education. The second group of states had either an unknown history with computer-based testing, a low rank in education, or unique events in their computer-based testing administration that were not representative of a first year experience.

State involvement with Smarter Balanced. Of the ten Smarter Balanced states who contracted with the same vendor for services, American Institutes for Research, one state was eliminated due to size. I eliminated four states due to the lack of diversity in their student population (i.e., the white population was larger than 85%).

The five remaining Smarter Balanced states were divided into two groups. The top group of three states had average expenditures and diversity. In addition, two of the three states had multiple years of experience in delivering high stakes large-scale accountability assessments on computers, making them the preferred states for Smarter Balanced. The other group of two states either had statistics that were not ideal, low expenditures, or a low education rank.

Political landscape. In selecting the final two states for my study, I reviewed current events to understand what happened in the states in the wake of the spring 2015 testing. States fell into three categories: (a) states with no reports of technical problems and few political issues related to testing; (b) states where the testing went well but there were problems handling the political climate and the opting out of students; and (c) states with both test administration and ongoing political challenges. In the third category, five states had significant ongoing issues requiring suspension of testing but none of these states were in my top groups. Table 3.2

illustrates the distribution of potential states from each top group (i.e., PARCC and Smarter

Balanced).

Table 3.2

Three categories for state selection and number of states from top group in each consortium

	Low Political Issues	**High Political Issues**
Low Technical Issues	Category 1	Category 2 (PARCC: 2; Smarter Balanced: 3)
High Technical Issues		Category 3 (PARCC: 1)

Given this research, I selected one state from category 2 and one state from category 3.

These states complemented the first state from category 1. The demographics of all three states

are shown in Table 3.3.

Table 3.3

Demographics for selected states

	Category 1 State	**Category 2 State**	**Category 3 State**
Consortia state	No	Yes	Yes
NAEP	Above average	Above average	Above average
# students	1.2 million	1 million	1.4 million
# schools	2000	2000	2500
# districts	150	300	600
LEP	8%	8%	4%
Free/reduced lunch	40%	40%	35%
Portion white	50%	60%	50%
Next ethnic group	Black	Hispanic	Hispanic and Black

Note: Data are rounded to preserve anonymity.

SEA leaders and staff sampling. Three interviews were conducted for each state. The primary interviewee was the SEA leader for assessment with a title similar to the following:

- Director, Assessment Operations

- Director, Office of Standards & Assessment

- Director of Test Administration, Scoring, and Reporting

- Chief Assessment Officer

The other two state interviewees were members of the primary interviewee's team in the SEA. Candidates were recruited via phone and email for participation.

District testing directors sampling. The survey was sent to state district testing directors via email. District testing directors are the primary interfaces to the SEA and responsible for the implementation of the testing on computers. For survey recruitment, the SEA provided the contact information for the district directors. Three reminder emails were sent to the testing directors. Survey respondents reflected the diversity of district demographics and socioeconomic status across the state.

Data collection

I collected data from documents available to the public, interviews with SEA staff members, and surveys to district testing directors. I followed the same procedures for all three states.

Document collection. I collected documents describing how the states approached computer-based assessments for K12 statewide accountability. These documents were gathered from Internet websites or state publications. The demographics of the districts were also collected through the use of public data sources. The consortia memberships were drawn from the consortia websites. The extent of any technical and political issues was determined by news stories from reputable organizations and other public documents. These sources are listed in the

References when there is no risk to the anonymity. When the source would indicate the identity of a state I selected, I used the term "citation redacted [x]", where the superscript x links to an unpublished list of references, reviewed only by my faculty advisor specified in the IRB.

Instruments. To document the factors affecting the adoption of computer-based assessments for K12 statewide accountability, two instruments were used: interviews and surveys. The interview protocol is in the Appendix A. At a high level, there were 28 questions in the interview protocol. There were four questions about SEA procedures for support and documentation. Seven questions explored the interactions between the SEA and districts, specifically related to communication, training and decision-making. Nine questions covered different aspects of human, technical, and financial capacity. Seven questions addressed the political landscape in the state and one question confirmed the number of schools participating in the testing.

The survey was a set of 21 questions delivered online to collect the data from the district testing directors. A four-point Likert scale, written in natural language specific to each question, was used for many of the questions. There were four multiple choice items with fill-in-the-blank options for "other" (e.g. For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), where do you do testing? Computer lab, School library, Classroom, Other) and two items with free response (e.g. Describe the training you received...). Questions were district-oriented and asked about the technology available in schools, the usefulness of the SEA in supporting test administration, and perceptions as to the success of the adoption. The survey questions were mapped to the research questions and are shown in the Appendix B.

The interview protocol and survey questions were modified for the second and third state to reflect the rise of the opt-out movement in spring 2015. At the direction of my committee, I

called together a focus group of educators in New Jersey (e.g., principals and district staff members from the student population at the Graduate School of Education at Rutgers) who had completed their first administration of computer-based accountability assessments. I conducted this 2-hour focus group activity on the Rutgers campus. Participants were not paid for this work but I provided light snacks and non-alcoholic beverages. The goal of the focus group was to gather additional information to modify the survey questions to reflect the testing environment in spring 2015.

Data collection procedures. The semi-structured interviews were scheduled at the participant's convenience. The interview occurred at their place of employment and lasted approximately 40-60 minutes. Interviews were digitally audio-recorded. All nine interviews were transcribed for subsequent coding and analysis.

Qualtrics was used to deliver the survey and collect the data. Participants received an email with a link to the survey using the Qualtrics email function. I received 244 completed surveys from the three states: 52 for "Non-Consortia State"; 69 for "SEA-centric State"; 123 for "SEA-District State".

Data analysis and interpretation

In my study, I had three phases of my data analysis and interpretation. In the first phase, I reduced the data collected in the interviews with coding. Second, I analyzed the data for patterns, code occurrence and comparison of the SEA interview data and the district survey data. Finally, I interpreted the data to draw conclusions.

Data reduction. For the interview portion of the study, the data reduction stage began with the transcript data collected from the interviews. All coding of the interview transcripts was done in Dedoose (http://www.dedoose.com/) and used a measurement rubric that mapped to the conceptual framework. Data that was counter to my framework was also analyzed for patterns

and subsequently fed into the interpretation. Coding of the interview transcripts is shown in the Appendix C. I also coded my field notes since they were likely to have direct connections to the framework.

Analysis. Making the transition from coding to analysis and interpretation is described by Coffey and Atkinson as moving beyond the data, slicing and reconnecting data in new ways to drive the interpretation of the data into meaningful conclusions (Coffey & Atkinson, 1996). Pattern coding is used to understand the interactions between the codes (Miles & Huberman, 1984) and help create theories and define patterns to map the inputs to particular outcomes.

Analysis of qualitative interview data included using Dedoose for analysis of code occurrence and code co-occurrence, which is where two codes occur at the same time in the interview data. Analysis began in Dedoose and continued in Microsoft Excel. The purpose of the survey was to triangulate the interview data. Instances in which districts (i.e., survey responses) and states (i.e., interviews) had different perspectives were indicated during analysis. The code structure allowed for inductive coding, which was particularly relevant given the modifications to the survey questions for the latter two states.

Additionally, a series of one-way ANOVA's were run to compare state level responses for each of the relevant survey questions. The independent variable was the state and the dependent variable was the mean response to each question.

Outcome Measures. I measured the two indicators of adoption, the technical implementation and the student participation. For technical implementation, I searched for news reports of outages or other interruptions to the testing in each state. Oftentimes, reports described "glitches" in the systems or SEA officials made public statements for certain outages and so these news accounts were reviewed for my study.   For student participation, the data collected

were annual assessment reports posted on the SEA official websites. These reports were the student assessment reports for each state which are aggregated student performance data. These data are state-specific with states noting the conditions for "not tested" which may vary for each state (e.g. states can designate "not tested" to include medical emergencies as well as refusals to test.) These two indicators of adoption were measured based on data collection from public documents.

Interpretation. All interpretation of the qualitative interview data and the quantitative survey data adhered to the following guidance for mapping data onto a conceptual framework. Wolcott (2009) described interpretation as an activity following analysis where researchers may bring their own perspectives on their reflections on the data. Using an analytical framework is described by Wolcott (1994) as critical when a researcher is looking for a structure for the data gathering through observations and interviews. He cautioned the researcher to balance this with a healthy skepticism to be sure all of the data are collected and analyzed and not just the data supporting the researcher's hypotheses.

Modified analytic induction is a method of qualitative research used to test preconceived hypotheses. Often case comparisons allow the researcher to develop new theories, disprove dominant theories or reinforce others' conclusions (Patton, 2002). I used this method to test my conceptual framework for each state, resulting in a generic framework and three state-specific frameworks of the effects of the SEA on statewide adoption of computer-based assessments.

Limitations of the Study

This three-state comparative study used the same data collection and analysis procedures for each state but the protocols were changed for the second and third states. I conducted the interviews with the first state in 2013 and administered the survey in 2014. The interviews for second and third states occurred in the winter and spring 2016 after the opt-out movement gained

national momentum and states were embroiled in public scrutiny over testing in general and specifically about the confusing downstream effects of the tests.

In response to opt-out movement activities in the spring 2015, my dissertation committee asked me to expand the interview and survey protocols to include questions about the perceptions of technical implementation and how the public may have affected student participation. These changes were implemented for State 2 and State 3. Because I did not have interview and survey data for State 1 on their perceptions of the effects of the opt-out movement, I collected public data and conducted document analysis.

A second limitation was the survey response rate. Survey response rates were 39%, 22% and 21% for the three states with a total of 244 responses analyzed. While conclusions cannot be generalized for other states, patterns did emerge in the analysis to support the framework of what SEA factors affect the statewide adoption of computer-based assessments for K12 accountability.

Lastly, in my role as a researcher, I am employed full-time at Educational Testing Service (ETS) as the Executive Director of Enterprise Technology Strategy, Innovation and Architecture. ETS develops educational assessments for both paper-based and computer-based delivery and has contracts for projects under the Race to the Top program. I am not in a position to sell or influence states in their contracting.

CHAPTER 4: FINDINGS

This study investigated the factors under SEA control that contributed to the successful adoption of K12 computer-based assessments for accountability. In the three participating states, state policymakers decided to institutionally adopt this innovation and the SEA was left to implement the assessments with the districts and schools. This was "trickle-down innovation" as often happens in institutional adoption when a decision is made at the top of the hierarchy and rolls down to the other stakeholders. Along the way, there was a national opt-out movement to reduce testing in K12 schools. Computer-based accountability assessments became subject to the actions of parents, teachers, students and the general public who supported students in their decisions to not take the test. The goal of this research was to understand the factors that the SEA controlled and how they affected student participation and technical implementation. In this chapter, I will discuss my findings for each state as well as a cross-state comparison.

Introduction

As described in Chapter 2, I used the terms innovation, technology and adoption, as defined by Rogers' seminal work on the diffusion of innovations, first written in 1962. In my study, the "innovation" was defined as the use of computer-based assessments for accountability and the "adoption" was making "full use" (Rogers, 2003, p.177) of this innovation throughout the state. Given multiple decision-makers, I used two indicators of adoption—student participation and technical implementation—to represent the two units of adoption, the student and the district respectively. Through document analysis, I learned the percentage of student participation. I collected data on the technical implementation and the SEA factors contributing to the statewide adoption through the interviews and survey. Using my conceptual framework, I drew conclusions about what factors were present in these three states for the adoption of this innovation.

Three SEA factors affected the technical implementation in all three states: (a) building of SEA and local capacity; (b) SEA-district interactions; and (c) SEA procedures and processes. First, in building capacity, all three states took measures to ensure enough technical capacity in the schools to test all of the students and to train all of the staff. The ability of districts and schools to build this capacity supported the technical implementation's migration path from paper- to computer-based assessments. A school migration path is the ability for the local stakeholder in the district or school to be able to determine how and when they will convert from paper- to computer-based assessments within the bounds of the state's policy and deadlines. In some states, for example, districts or schools decided the timing, intermediate steps and the schedule so long as they abided by the deadlines defined by state policy. Second, the interactions between the SEA and the districts included districts attending formal SEA trainings and both staffs informally discussing issues that emerged in the implementation. One state encouraged an informal network of test directors and another provided consultants to bolster the district staff in the first year. Finally, as a part of SEA procedures and practices, districts expected the SEA contractor to provide documentation and ongoing support as it had in the past. However, moving to computer-based assessments required more state leadership to support districts through the change. Human and technological capacities, interactions between stakeholders, procedures and practices proved to be critical components for technical implementation. Other states elected to abandon their testing altogether where the technical implementation did not go well (Molnar and Ujifusa, 2015). On a positive note, the technical implementation of the three states in my study went well and this adoption indicator had little influence on student participation.

Some of these SEA factors and the politics associated with accountability testing affected student participation. Nationally in 2015, computer-based consortia assessments were implemented in many states. The opt-out movement was vocal and active with educators and parents supporting students who refused to participate. These new assessments were prime targets. All three SEA factors contributed to a reduction in student participation in the two states where high school students refused to test at unusually high rates. Unclear SEA communications also led to more stakeholders protesting and drove down student participation. For one state, the cycle of students refusing and then expecting to be instructed further complicated district operational scheduling and inadvertently encouraged more students to opt out. This opt-out movement was fed by missteps in the first year for two of the states in this study – the states participating in the consortia assessments of PARCC and Smarter Balanced. In the second year for both states, the SEAs improved their capacity, interactions, procedures and processes and enjoyed higher student participation in the second year.

As described in Chapter 2: Methods, for all three states in my study, I conducted my research and analysis holistically as a view "on the ground" of the SEA's role in the statewide adoption of computer-based assessments for K12 accountability. I interviewed nine SEA staff members, surveyed 244 district testing directors, and conducted document analysis with public records.

In this chapter, I describe the findings of my study. I describe the findings for each state and then across all three states. I start with the most complex state – the SEA-District state which struggled with managing local capacity issues and district interactions. The second state is the SEA-centric state whose focus on their procedures and practices enabled the technical implementation but negatively impacted student participation due to unclear ramifications of

these procedures. The third and final state is the Non-Consortia state whose gradual adoption of this innovation helped to make their implementation successful. In the cross-state comparison, I look at similarities and differences between the states: the student participation in the consortia states was lower and districts felt less supported; the number of districts may affect the ability for the SEA to effectively communicate; districts feel more independent when they are given decision-making authority.

SEA-District State

The story of technical implementation for this state is a bit like, "So Mrs. Lincoln, how did you like the play?" In spring 2015, no system outages occurred during testing. The following spring, the state experienced a one-day outage from which they recovered by locally rescheduling students to test within the testing window. Despite this effective technical implementation, student participation was a significant issue across the state with high school students opting out at high rates. This reduced participation dramatically affected the extent of statewide adoption and complicated the SEA operational scheduling and communications.

In 2015, a strong opt-out movement was fueled by some privacy controversies (e.g. Pearson reported to the SEA the names of students who posted test content on social media) as well as advertising which was supportive of the teacher union and against statewide accountability testing. TV and print ads targeted parents and teachers and encouraged them to support students refusing to take the test. Such anti-testing publicity declined in 2016. However, data from spring administrations in 2013, 2015 and 2016 in SEA-District state indicated an explosive movement of students refusing to test, especially in the high schools. There have been studies recently on the opt-out movement and in these studies, the rates of non-participation are dissected to estimate the number of students who refused to test as a subset of all students who did not test (Harris & Fessenden, 2015; Supovitz et al, 2016; Bennett, 2016). For my study, I

used the rates of non-participation or "not tested" as reported by the SEA in their annually posted

accountability reports. I used 2013 as the point of comparison because it was a more traditional

testing year; 2014 was the first year of the consortium testing pilot. Table 4.1 shows the data for

students not tested in English Language Arts in grades 3, 8 and high school.

Table 4.1

Percentage of students not tested in ELA in SEA-District state in 2013, 2015 and 2016

	Percentage of students not tested in ELA		
	2013	2015	2106
Grade 3 and Grade 8	Less than 1%	$\approx 5\%$	Less than 5%
High School	Less than 1%	$\approx 33\%$	$\approx 25\%$

Note: Data are rounded to preserve anonymity. Citations redacted [2, 3, and 4]. These data sources
are the SEA state accountability assessment reports where the aggregated student performance is
posted annually on the SEA website for the public.

While the state designation of students as "not tested" covered several conditions, including

opting out, the student participation indicator of statewide adoption was very problematic. Yet,

the technical implementation indicator was positive.

In order to understand the scale of work within this state and set the context for the

findings to be generalizable beyond SEA-District state, some state-level characteristics are worth

describing. All data retrieved from IES NCES NAEP State Profiles data (NCES, 2017). The

SEA-District state had approximately 2500 schools organized into over 600 school districts.

Each district had a designated district testing coordinator. From NAEP data, the state enrolled

close to 1.4 million students.   Less than 4% were identified as having limited-English and less

than 35% received free or reduced lunch. Half of the student population was white. Of the non-

white population, two in five students were Hispanic; two in five students were black; and one in

five, Asian. This state performed above the national average on NAEP tests. This state is a member of one of the two national consortia for accountability assessments.

In June 2016 I interviewed three staff at the SEA office and distributed surveys to district testing directors. I sent over 600 email invitations and 123 district testing directors agreed to participate. In the next three sections of this paper, I use the data from these interviews and surveys to describe the role of the SEA in their statewide adoption of computer-based accountability assessments.

The big challenge in SEA-District state: Bidirectional influences of student participation

In SEA-District state, two SEA factors most affected the statewide adoption of computer-based assessments for accountability. The most significant factor was the lack of SEA and local capacity with the operational scheduling of the assessments. This issue impacted the public view on testing and energized the opt-out movement. The SEA and district staffs both reported operational scheduling as a challenge. The second most significant factor was the SEA-district interactions where many activities (e.g. support of high visibility districts) enabled technical implementation but communication with districts was a challenge. By focusing its efforts on the technical implementation, this SEA did not foresee the negative impressions the operational scheduling and inconsistent communication would have on their stakeholders.

In Figure 2.2 from Chapter 2, I represented my generic conceptual framework of the variables and expected effects on the two indicators of statewide adoption of computer-based accountability assessments. Figure 4.1 is a representation of the effects of each variable in the SEA-District state.
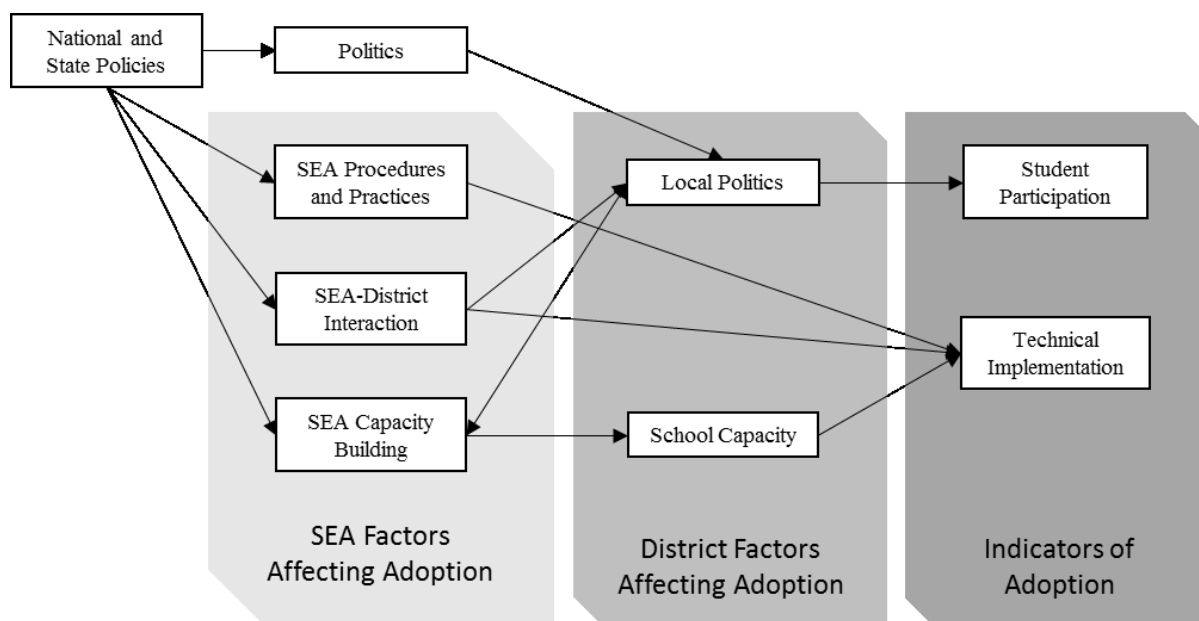
Figure 4.1. Conceptual framework applied to SEA-District state showing the effects found to be present in this state.

All three SEA factors contributed to the technical implementation. National and state policies affected politics as did the SEA-district interactions (i.e., communication about testing times) and the SEA capacity building (i.e., operational scheduling of testing times), which emboldened the anti-testing movement in support of students who opted out of taking the test. Student participation was unaffected by the technical implementation.

Twelve issues contributed to the indicators of statewide adoption for SEA-District state. They are outlined in Table 4.2. I will use this structure to organize the results, first describing the factors that affected student participation and then describing the factors that affected technical implementation. I will end this section with closing comments about this state.

Table 4.2

Issues affecting indicators of statewide adoption for SEA-District state

Technical Implementation	Student Participation
SEA Capacity Building	
• Technical capacity	• Operational scheduling
	• Time spent on testing
SEA-District Interaction	
• Answering questions	• Communications
• Regional training	
• Consultants into schools	
SEA Procedures and Practices	National and State Policies affecting Politics
• State leadership in the consortium	• Anti-testing and social media
• Accessibility	
• Digital natives	Technical Implementation
• Contractor support and documentation	• No effect due to outages since makeups occurred for the one-day outage

Bidirectional influence of SEA capacity building with local politics and student participation

The SEA needed to advise districts on how they might schedule students to test based on the number of computing devices available to them and the time needed for the assessments. This advisory service relied on local resources to evaluate their capacity and schedule the testing for each student in a way that made sense for their schools. This scheduling proved to be difficult in terms of both the operations as local administrators struggled to occupy students as

more and more opted out of testing and the communications to students and parents who interpreted a testing window to mean that no instruction would occur for any students. This misinterpretation mobilized the local opt-out movement in support of students refusing to test. This issue was more significant in 2015; the SEA and districts worked to reduce its effect in 2016 through a variety of approaches.

Operational scheduling. In 2015, operational misperceptions existed. One respondent provided an example, "There [was] a perception that you've got to test students first thing in the morning … [in] a paper-and-pencil world, we were very deliberate in telling districts you must test in these hours, in these mornings." With paper-based testing, it was possible to do all testing in a three hour window for all students. When the schools planned for computer-based tests the first year, they used the same models but spread the testing out over the entire 20-day spring testing window which the public perceived to mean that there would be no instruction for students during all those days. The respondent further explained how it became immediately evident that the state needed to improve operations the following year since computer-based testing took more time away from instruction than expected. The District-SEA state needed to allow districts flexibility so districts could optimize scheduling based on their local capacity. This new flexibility required guidance from the SEA and all three SEA interviewees went out to districts to work with them.

This became a big challenge for districts that needed to schedule online tests for test takers and instruction or activities for those refusing to test. Operationally, according to the district survey, most of the testing in schools happened in classrooms (95.73%) but districts also used computer labs, libraries, offices, gyms and cafeterias. An interview respondent acknowledged the influence scheduling had on public perceptions. "I think how the scheduling

happens impacts the perception of testing that parents have." Another described a "tipping point" when so many students had refused to test that instruction was happening in the classroom. This prompted other students to skip testing and go to class for fear of missing content with Advanced Placement (AP) exams approaching. This cycle further complicated the scheduling as schools needed to provide students with both testing and instructional options. A third respondent remarked, "Parents no longer just wanted to keep their kids at home or just not test. They wanted their kids to be instructed."

By the second year of implementation in 2016, the SEA and districts understood the issues and potential solutions. Working with the districts to further decrease the time spent on testing may have contributed to an increase in student participation in 2016, relative to 2015. One respondent described the communications as being productive year-to-year: "Going from year one to year two, we've sort of worked with a lot of districts, and I think we have to continue, but we're seeing the creativity..." Another respondent discussed a PowerPoint tool that was developed to help schools "create a schedule that satisfies their ability to administer within that window."

The SEA may have also contributed to an increase in student participation with a shortened testing window. In 2016, SEA leaders changed the two 20-day windows in 2015 (i.e., fall and spring) to one 30-day window, combining the performance assessment with the end of year tests. In the discussions between the SEA and districts, a respondent stated that the state did "have some insight in not only [the districts'] 30-day [testing window] or their plans, but also sometimes we get into the intricacies." This reduction in the testing window at the state level allowed schools to create a better schedule for their stakeholders and potentially increase instructional time.

Time spent on testing. Seeing this operational scheduling challenge and how it affected the public perception of too much time spent on testing, one respondent described the state taking an active role with "the biggest school districts in the state… where we were on top of it because failure there would've been big, not just in terms of scale, but also in terms of visibility."

In the past, parents simply kept students home if they didn't take the state mandated exam. This happened on the one morning in spring that the test was scheduled. But in spring 2015, the 20-day testing window was misunderstood by parents. As one respondent observed, "I think perceptually for parents they're saying, 'Wait a minute. Where's the instruction? These kids are missing a lot of instruction.'" One in five district survey respondents said it was very challenging with time spent on testing (20.91%). This became a galvanizing issue for the anti-testing movement and parents, especially of high school students who did not want their children taking time away from instruction during finals and AP preparation.

SEA-District interactions' effects on local politics and student participation. Communication was problematic in this state, despite the SEA perspective of their importance to the districts. Only 15.45% of district survey respondents believed the state was a "helpful provider of all information." One reason for this may have been the inconsistent direction from the state, something 12.96% of district survey respondents found very challenging. That said, in response to the question, "How important is the SEA as a source of information for the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced)?" close to half of the district respondents (41.44%) reported that the state is a critical source of regulatory information. This reliance on the SEA for regulatory information—but not finding them helpful—may be due to the role of the consortium in the technical implementation specifications

and the sheer number of districts with whom the SEA needed to communicate. I will discuss this more in the cross-state analysis at the end of this chapter.

Effect of politics on student participation in SEA-District state. Two factors could impact student participation: the effect of politics and policy on a student's decision to refuse to test and the effect a failure of technical implementation could have on a student's opportunity to test. In this state, there were no significant outages. The only effect on student participation was students' decisions to refuse to be tested and their parents' permission to do so. For this state, three major issues drove students to opt out: (a) the anti-testing movement and its mobilization through social media; (b) the perception of too much time spent on testing over instruction (as previously detailed); and (c) the perceived utility of student test scores.

Anti-testing and social media. The discussion of the opt-out movement in this state dominated the interviews. In 2015, there was a media backlash against testing in this state. One interview respondent described how "social media sort of changed that game." In addition to the "commercials… radio… billboards," the respondent explained that social media allowed parents to better organize into a movement. This anti-testing movement was vocal and surprised SEA staff who were so focused on the technical implementation for the first year of statewide computer-based testing. Another respondent said refusals "began to explode… around 2012-2013, 2013-2014." While this was not evident in the 2014 data (when less than 1% of students did not test), this perception might be that the SEA staff members heard some objections but students continued to participate. But in 2015, over a third of high school students refused to participate.

The SEA recognized the burden this anti-testing movement placed on the staff in the schools and districts. According to one interview respondent, high school principals were in "an

untenable position between trying to enforce the federal law… [but] you can't chain a kid to the desk." Another commented that the refusal to test was in conflict with the state "administrative code… the expectation is that any student enrolled in any of the grades for which the [SEA leader] has deemed it appropriate to assess, the expectation is that the children will participate." This expectation of adherence to the code was shared by administrators, but parents and students still refused.

In 2016, student refusals continued to be an issue, but at a lower rate. Less than a quarter of students did not take the test. One noticeable aspect of 2016 was that there was also less publicity for the opt-out movement. Participation was perceived to be higher (47.32%) or a little higher (28.57%) by district survey respondents in comparing 2016 to 2015. Only 18.75% of district survey respondents perceived participation lower in 2016 than 2015 and this may be due to pockets with high opt-out rates. Overall, participation increased in the second year and this was consistent with district perceptions.

The district testing directors perceived operational and community support challenges as smoother in 2016 as well. Specifically, district survey respondents perceived computer-based testing administration as relatively smooth with teacher support (54.21%), student support (52.83%), staff preparedness (52.73%) and information provided (36.70%). These supports may have had a positive impact on the student participation.

Use of test scores for teacher evaluations. In my study, I do not cover one aspect worth mentioning: the use of student results in teacher evaluations. This state's policy for teacher evaluation included a percentage for student test scores but with the introduction of the consortium assessment, the state increased the value of student results in the evaluation of the teacher. The state's teachers' union "staunchly opposed" the new test and "launched a multi-

million dollar ad campaign" against it (citation redacted [5]) and students supported the teachers by refusing to test. Although this is not an area of exploration in this study, I acknowledge the influence this had on the politics in the state.

SEA factors affecting technical implementation

The SEA factors supporting and enabling the technical implementation are the SEA Capacity Building (i.e., building technical capacity in districts), the SEA-District Interactions (i.e., SEA answering district questions, conducting regional trainings, and sending consultants into the schools), and the SEA Procedures and Practices. For the SEA Procedures and Practices, one SEA activity helped the technical implementation: involving educators in the development of the assessments with the consortium. Other activities carried out by both the SEA and districts helped, such as the use of contractor support and documentation.

SEA and school capacity effects on technical implementation. The SEA and the local capacity of districts and schools can affect the technical implementation since having the right amount and level of resources during a change can be very important. In the SEA-District state, the technical capacity was built quickly to allow for this change to computer-based assessments since they had only limited, district-elected, pilot experience in online accountability assessments.

Districts used a variety of sources to build their capacity. District survey respondents (84.62%) confirmed their budgets handled the procurement of devices and augmented this with local foundations, national programs and other grants. The SEA also provided funds to some districts as needed through state legislative action. The migration path from paper-based to computer-based tests was a hard cutover (i.e. all schools moved at once) in 2015 with 86.32% of respondents reporting that the decision to move from paper to computer was made at the state

level. Because of this SEA mandate, the districts needed to be proactive in building their capacity and most of them did.

The SEA and districts differed in the value they placed on building technical capacity locally for the everyday use of technology. The SEA envisioned a more integrated use of technology in the classroom but districts lagged behind. One interview respondent described, "What we're hoping for ultimately is really truly the 21st century classroom which has technology sort of seamlessly integrated into instruction, where students and teachers use it appropriately, not just because it has bells and whistles." Consistent with this vision, district survey respondents reported that schools had enough computers (73.11%), tech support (87.29%) and bandwidth (96.62%) and that the computers were compatible with the testing systems (94.87%). In contrast to this vision of the 21st century classroom, only 47.06% of district respondents used computers often throughout the school year and 15.97% rarely used them.

SEA-District interaction effects on technical implementation. Three significant issues in the interactions between the SEA and districts are answering questions, providing and participating in regional training, and sending consultants into schools. These personal interactions between the state and the district staffs were to inform and support bidirectionally the work they each did to administer the statewide accountability assessments.

Answering questions. SEA staff worked with all district and school stakeholders to answer all of their questions. Much of the communication about optimizing scheduling or in review of district data was over the phone, at trainings, and during trips SEA staff made regularly to the field. An interview respondent described the SEA approach as "no email goes unanswered, no phone call goes unanswered, no phone call goes unreturned, which is not

necessarily what people get from [other] state agencies." This appeared to be a part of the SEA culture as also described by a second respondent:

> I refuse to turn anyone down who calls me. I will not say, 'Oh, you've got to go
> to your district test coordinator and have them call.' No, I refuse to do that. If
> you call me, if you need help, I'm going to help you. It's a little time consuming,
> but it is what it is. I feel it's [a] part of my job… I'm a problem solver. I pride
> myself on solving problems.

An interesting facet of this culture of proactively supporting the districts was that the agency and decision-authority resided with the district. SEA staff described many conversations with stakeholders but continuously stressed the need for those stakeholders to own the decisions they made. One interviewee described it well:

> I want us to make sure that we tackle certain issues so that we're not telling them
> what to do, but we're providing them with suggestions, we're providing them
> with alternatives, ultimately making sure that the district understands that they are
> responsible for what they're doing.

This support of the districts extended to the district interaction with the online systems. One respondent explained that one time a whole school mistakenly ordered Braille tests even though they had no students with low vision. The online system allowed the school to enter the data but the SEA staff were monitoring the orders and proactively connected with the school to get it corrected.

Regional training. The SEA conducted two regional trainings: one for overall policy and test administration and the other for technology. Their engaged culture extended to those settings as well. According to an interview respondent, "My staff and the [contractor] staff

won't leave [the regional trainings] until every question is answered." These regional trainings included the tech coordinators, district testing directors and the state contractor. Consistent with the SEA interviews, the district testing directors who participated in the survey reported that they relied on information from the following to do their job: local tech coordinators (57.01%); the Internet (38.46%); the state test contractor (37.96%); school personnel (37.04%); state policy information sources (29.91%); and other district testing directors (21.30%). These trainings provided the resources they needed.

Consultants into schools. In this state, the SEA also contracted with consultants to go out to districts needing some extra help. The district had ownership of their implementation plans but these consultants helped to develop them. This support was targeted at districts most in need and was consistent with the culture of the SEA to provide guidance to all districts while still giving them decision-making authority.

Effect of SEA procedures and practices on technical implementation. SEA procedures and practices are often driven by the state policy and are constrained by the resources available. Four significant factors in this state affected the statewide technical implementation: (a) state leadership in the consortium; (b) procedures for accessibility and accommodations; (c) testing digital natives; and (d) contractor support and documentation.

State leadership in the consortium. SEA staff needed to create and maintain a strong network to support the new assessments because as one respondent described, the state's local educators (e.g. teachers) were "very proactive" and leaders in the consortium. Specifically, a group of educator leaders from the state stayed connected to the consortium work and spread the information to their peers. A second interview respondent similarly described the state's leadership in the consortium by encouraging the participation of state educators:

[The consortium] had very strategically included a lot of them in developing the

test, writing the test, higher ed [sic] had been involved in setting some of the

guidelines, you know, there had been all of this coalition work, so we were able to

keep those folks moving forward in the belief that this is the way to go… we were

working really hard on marshalling a coalition along with us… with the

organizations, the ed [sic] organizations at the state level, like the Supervisors and

Principals Association, the Superintendents Association, the School Board

Association, the [PTA], right. So we were working very hard on making sure that

we kept everybody together.

The SEA depended on this tight network of educators to be advocates for the assessments and

the changes the SEA was attempting to implement. Yet, despite their involvement in the

assessment development, many educators supported opt-out activities.

Procedures for accessibility and accommodations. In this state, the guidance for

students requiring accessibility and accommodations was not always clear or consistent. The

SEA needed to explain the policies and procedures for the new assessments given that they were

delivered by computer with embedded accessibility functionality. One respondent described the

changes:

We have several things, which is different than what we've done in years past… what

we've adopted now are supports that are accessibility driven, meaning that these are

accessibility features that all students can have regardless of their programmatic

affiliation, again, general ed [sic], special ed [sic], EL. And then we have our testing

accommodations that are IEP, 504 or EL driven. And then we also have another

component which is referred to as administration consideration.

As an example, the need for larger text might have previously been handled with an accommodation for large print but in the computer delivery, it was a standard feature requiring no special order. According to all three interviews, the districts needed training and consultation on how to handle students requiring these services.

Testing digital natives. In this state, the SEA viewed the assessment as a more engaging and authentic assessment for students. As one respondent explained, however, despite the state's perspective that the test was stronger and based on the full set of standards, "what we heard from the field was that you can't do like [sic] evaluations or accountability using bubble tests. You need to show what students can do… more of a demonstration of students' skills of writing, reasoning, [and] modeling." Another respondent went further to say the consortium test was significantly better than the previous test because students are digital natives, meaning they are born into and grow up in a technology-rich culture. A third respondent agreed:

> Kids today, they are born with a cell phone in their hand… They come out snap
> chatting already, so technology is not something that's new to them… but the
> manner in which we're using it is new… online testing, it's just the way the future
> is going. But for kids, that technology exposure, it's already been there.

This alignment of student expectations on the use of technology and the SEA's ability to provide them a modern experience (i.e., not a paper and pencil bubble sheet) helped the technical implementation since technology was in the schools already. It also aided student participation because students expected a computer-based experience.

Contractor support and documentation. As the SEA expected, districts utilized the documentation and the contractor for support in preparation for and during the administration of computer-based accountability assessments. District survey respondents reported that they

talked to them often (20.18%) and sometimes (50.88%). The majority of the survey respondents (87.83%) used the state documentation often or as questions arose. These resources provided support to the districts for the test administration and to ensure a smooth technical implementation.

Concluding comments on SEA-District state

SEA-District state focused on the technical implementation as their schools quickly moved from paper to computer-based assessments for statewide accountability assessments. With that focus, they successfully deployed technologies, processes and people so schools could assess students in their first year. Unfortunately, they did not realize the effects certain district capacity issues, like operational scheduling, would have on their stakeholders and how inconsistent communication with districts fed an already active anti-testing public. Students in high school refused to test and expected to be instructed in the classroom, driving other students to also refuse in fear of missing content for upcoming AP exams. This state, like the next state, SEA-centric, was successful in its technical implementation but failed to support all students in their participation.

<div align="center">

SEA-centric State

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Technical implementation and student participation affected the extent of statewide adoption in SEA-centric state. In spring 2015, as mentioned in Chapter 3, there were very few technical issues with implementation. However, because the state's experience with large-scale assessments for accountability had been with paper-based, state-designed assessments, the change to computers was significant. It was met with resistance from its stakeholders, sparking considerable political issues. In 2015, the opt-out movement was strong and successfully influenced student participation, particularly at the high school level. One high school in particular had 100% of students in 11th grade refuse to take the exams. Across the state, this

translated into nearly half of the students in Grade 11 opting out. Their scores were counted as not meeting the standards, directly impacting federal accountability measures. This state's focus on technical implementation in the first year was overshadowed by the reduced student participation and resulted in diminished statewide adoption.

As described in the Methods chapter, purposeful sampling of states was done to ensure a representative sample. All data was retrieved from IES NCES NAEP State Profiles data (NCES, 2017). NAEP data show that SEA-centric state had over 2000 schools organized into fewer than 300 school districts. Each district had its own district testing coordinator. The state enrolled approximately one million students. Less than 8% were limited-English and more than 40% received free or reduced lunch. Out of every five students, three students were white and one was Hispanic. This state performed above the national average on NAEP tests. The SEA was a leader in the adoption of CCSS and their consortium activities, with an eye on enacting change in their state to improve academic outcomes. As a leader in educational change, the SEA was positioned to provide a guiding role to the districts as they migrated from paper-based to computer-based assessments and tried to navigate the political environment.

In January 2016 I conducted interviews at the SEA office with three staff participants. The date collected referred to the spring 2015 administration of computer-based accountability assessments. I distributed surveys to district testing directors in June 2016. This data included the spring 2016 administration. I sent over 300 email invitations with 88 responding and 69 completing the survey. These next sections draw from these interviews and surveys to provide information about the SEA's role in statewide adoption of computer-based accountability assessments.

The big challenge in SEA-centric state: SEA procedures and practices

As described earlier, the opt-out movement was significant in this state with its effect on 11th grade refusals to test both in 2015 and 2016. In 2015, just under half of the high school students refused to test and in 2016, two out of five 11th grade students refused to test. At the same time, over 95% of eligible elementary school student participated in the assessments. District survey respondents believed student participation was better in 2016 than 2015 which is supported by the state data. One explanation for the increase in participation may be that three key issues (i.e., confusion over graduation requirements, backlash to the time spent on testing, and misunderstanding on first year turnaround time for scores) were recognized by the SEA, as shown in the interviews, and were addressed in revised procedures and practices.

As previously described in Chapter 2's Figure 2.2, I represented my generic conceptual framework of the variables and their expected effects on the two indicators of statewide adoption of computer-based accountability assessments. Figure 4.2 is a representation of the effects I found in the SEA-centric state.
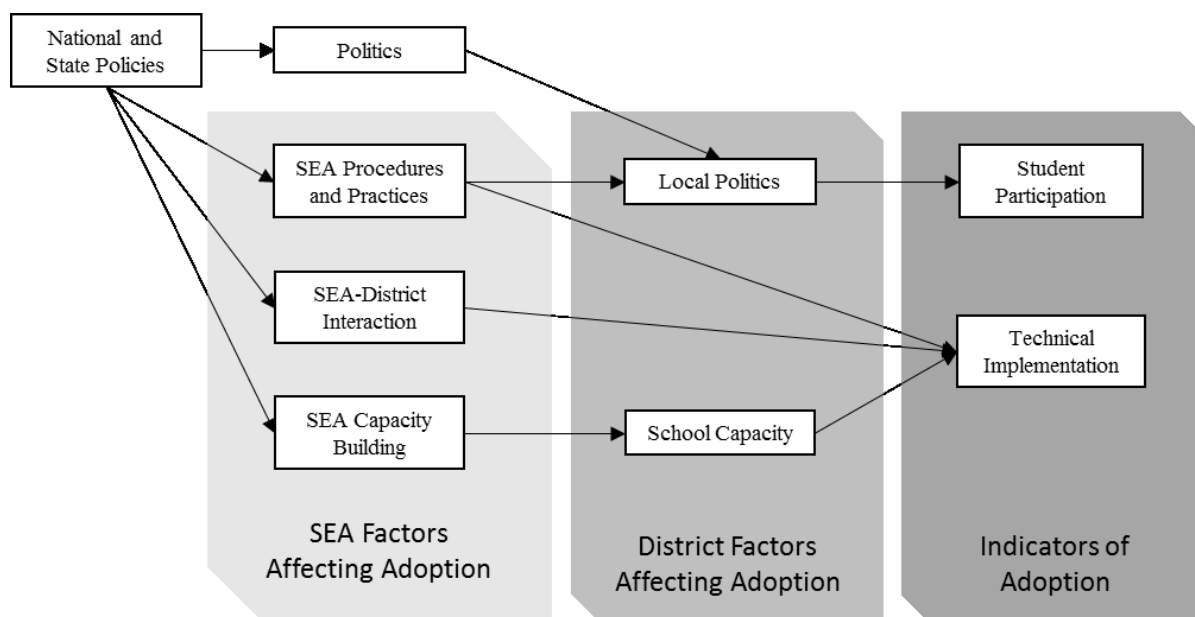
Figure 4.2. Conceptual framework applied to SEA-centric state showing the effects found to be present in this state.

SEA-District Interaction, SEA Capacity Building, and SEA Procedures and Practices contributed to the technical implementation of the computer-based assessments. National and State Policies affected Politics and in turn Local Politics as did one of the implementation factors, SEA Procedures and Practices – and politics certainly had an impact on student participation. Student participation was unaffected by the Technical Implementation.

SEA Factors affected the technical implementation in preparing districts and managing the administration of the assessments on computers. One SEA factor also had an indirect impact on student participation: SEA Procedures and Practices. Politics negatively impacted Student Participation and despite the Technical Implementation, a significant number of students refused to test. Table 4.3 includes the issues for each factor and will serve to organize this case study for "SEA-centric State".

Table 4.3

Issues affecting indicators of statewide adoption for SEA-centric state.

Technical Implementation	Student Participation
SEA Procedures and Practices	
• Documentation	• Confusion over graduation requirements
• State leadership	
• Support from the state contractor	• Time spent on testing
	• Turnaround time for results
SEA-District Interaction	National and State Policies affecting Politics
• Enabling and encouraging the informal network amongst the district leads	• Mobilization of the anti-testing movement and anti-consortia advocates
• Answering questions from the districts	
	Technical Implementation
• Providing formal training and information distribution	• No effect in this state
SEA Capacity Building	
• School migration path	
• Human capacity	
• Technical capacity	

Factors Affecting Statewide Adoption in "SEA-centric State"

One factor affecting technical implementation, the SEA Procedures and Practices also had a negative effect on the politics in the state which in turn affected the student participation. The SEA procedures governing how the assessment could be used for graduation requirements

and the turnaround time for results as well as the practice of the amount of time spent on testing energized the existing anti-testing movement and the anti-consortia activities in the state.

Nine issues were important in the technical implementation of computer-based accountability assessments in this state – three for each of the three SEA factors affecting statewide adoption. SEA-District Interactions benefited from activities to enable an informal network of district peers, active and engaged answering of district questions and providing formal training to districts. The SEA Capacity Building was increasing School Capacity gradually, allowing for districts to build their human and technical capacity and define their path to migrating to computer-based tests. Finally, the documentation, leadership from the SEA and state contractor support were aspects of SEA Procedures and Practices enabling the technical implementation.

The SEA and district staffs both believe the state leadership, provision and utility of documentation, informal district communications with or enabled by the SEA, definition of a practical migration path, and the environment (public support in particular) are key contributors to successful adoption. However, the SEA placed more value on communication with the state contractor and formal trainings than did district respondents. They also had different perspectives on the technical capacity in the schools with the SEA indicating more technology was available than the districts perceive they need to be successful.

In the next section of this case study, I describe the biggest challenge for this state – the SEA Procedures and Practices and its effect on both student participation and technical implementation. In this state, student participation was affected by other activities outside of the SEA such as the anti-testing movement and this is covered in the second section. I then describe

the other factors of technical implementation – the SEA-District Interactions and capacity-building. Finally, I have closing comments for this state.

SEA procedures and practices effect on student participation. Three issues became known to the public and emboldened anti-testing efforts: (a) the confusion over graduation requirements and whether the assessments could be used for this; (b) the perception that too much time was spent on testing and too little on instruction; and (c) parents' misunderstanding of the turnaround time for score reports and their conclusion that scores were late and lacked utility. These factors had a negative impact on the politics, increasing the number of students who refused to participate.

Confusion over graduation requirements. The SEA was not clear in their communication with parents, students, schools and administrators about how and if the 11th grade assessments would be used for graduation requirements. Students could achieve the graduation requirements in different ways and the accountability assessment was only one of these options. Parents, teachers and students did not know if the 11th grade test mattered if a student had already achieved the graduation requirements. However, the schools needed the students to take the test for their performance reporting and federal accountability on adequate yearly progress (AYP). As a result schools continued to push students to test. This confusion enabled the opt-out movement to mobilize the 11th grade student cohort to refuse to take the exam.

The SEA staff spent much of their time trying to allay stakeholder fears during the first year. As one interviewee admitted, "Our big burning issue was the high schools with our confusing graduation requirements." All three respondents shared similar views about how the policy for graduation conflicted with the interests of 11th graders preparing for college entrance

exams (i.e., SAT and ACT) and AP exams. One respondent explained: "The score was meaningless to [the 11th graders who opted out]. It was only giving the school something to report to the feds [sic], but that was all. It didn't benefit them. There was no other benefit to it. So we had a very high refusal rate in high school for grade 11." One district survey respondent described this as well:

> High school is still the most challenging level for state assessments because of different assessment graduation requirements for each cohort (this will be worked out by the time the class of 2017-18 graduates), and the fact that students who have already met their assessment graduation requirements are still required to take the state assessment for participation reporting.

Another district survey respondent wrote how motivating students to take the mandatory tests for school accountability were challenging especially when students did not need it to graduate. This confusion for students, parents and teachers opened up an opportunity for the opt-out movement to decrease student participation.

   Time spent on testing. The issue of time spent on testing was a public facing issue and served as a lightning rod for the public protests and anti-testing movement. The U.S. Department of Education responded to this public outcry in October 2015 with the following statement: "We recommend that states place a cap on the percentage of instructional time students spend taking required statewide standardized assessments to ensure that no child spends more than 2 percent of her classroom time taking these tests" (U.S. Department of Education, 2015.) One interview respondent believed this policy would inspire a greater opt-out push for the next year, but as described earlier this did not happen.

I don't think parents had that much hatred for the test. High school parents heard

the messages about opting out and I expect that our opt-outs in other grades might

spread a bit this year, because we had very few opt-outs in the lower grades. I

expect it might catch on a little bit more. They feel vindicated by the administration

saying, 'No more than two percent testing.' Of course that was for state summative

testing and our state summative testing takes about one percent of instructional

time, so its way under the two percent threshold, but that's a message that has to

get out.

Time spent on testing was an issue for the federal and state education authorities as the public

was pushing back on assessments and trying to increase instructional time.

This issue trickled down to districts which they perceived to be the biggest challenge in

operations in 2016. When asked "how challenging was it to deal with the following aspects of

the administration of the annual statewide accountability assessments this year," almost 70% of

district survey respondents found the time spent on testing to be either very challenging or

somewhat challenging. One survey respondent felt strongly enough to write: "Too much time

testing our students, I think it has become child abuse in the state… not enough instructional

time." Time spent on testing was "very challenging" to three times as many respondents

(30.3%) than any other issue. Other issues considered "very challenging" included: utility of test

scores (10.6%); information provided (10.6%); and consistency in state direction (9.1%). Time

spent on testing was addressed at the federal level, dismissed at the SEA level, and very

challenging at the district level because of how much it energized the opt-out movement.

Turnaround time for the score reports. Stakeholders could not see the value in the

scores for their children as individuals since they did not drive current year instruction or next

year placement for their student. The state informed parents that it would take three weeks for the scores to come in, but schools accessed them at the end of the school year while parents received scores in September. One interview respondent acknowledged how students wanted faster score reporting but to save money, they held the printed parent reports until all results from all tests were completed. "The printed reports… for families didn't get to the schools until the second week of September… but actually schools did have results in six to eight weeks." Because parents, teachers and students did not receive the scores as promised and they pointed to the assessments as having no educational utility for students—just federal accountability for schools.

One comment from a district survey respondent explained why speed of reporting was important for 11th grade students: "Speed of reporting - seniors scores need [sic] to graduate but the official scores come out mid-summer." However, on this topic of educational utility and speed of reporting, not all districts perceived it as challenging. When asked "how challenging was it to deal with the following aspects of the administration of the annual statewide accountability assessments this year," 53.03% of survey respondents said dealing with speed of reporting was relatively smooth.

The effect of SEA procedures and practices on technical implementation. The SEA procedures and practices influenced adoption primarily through documentation, state leadership, and state contractor support. The SEA and districts appreciated the first two, but only the state emphasized the third. Procedures and practices of the SEA certainly had an effect on the successful adoption by the districts, especially in the provision of documentation.

Documentation. The documentation for the test delivery and score reporting systems was provided by the state contractor while the consortium supplied documentation for the

operations. Because the documentation was coming from different sources, the SEA had no control over its production, timeliness, or accuracy. This was especially troublesome for the consortium materials. One respondent explained: "So there were policy decisions being made by the consortium, by member states of the consortia, right up 'til almost a couple weeks before the administration of the test that might impact the teacher, the test administration manual." The SEA's past practice was to develop the documentation in house so their transition to outsiders supplying it was a difficult experience for them. Consistent with this SEA view, 88.1% of district survey respondents utilized the documentation often or to answer questions. One respondent commented on the size of the manuals ("ungodly large manuals that no human could possibly read") while another suggested the documentation was improving over time.

State leadership. State leadership was required when the contractor or consortium could not conduct the procedures or practices in a timely manner, especially in the coordination of administration information and in the data exchange and integration. The SEA saw these challenges as an opportunity to lead through change.

One respondent explained that the delays in documentation required SEA staff to "apologize for not having materials in front of schools." The respondent recalled, "I now need to communicate that, 'Sorry, this is a late-breaking change of policy and I'm really sorry'." Another stated, "We wanted to let them know that we're sorry, and we'll work with them and just do the very best you can." The respondent added that when answers did not exist, "it's something that we need to decide" and they structured a team to do just that. A third respondent also described working with districts as "whatever the problem is we're collaborating to fix the problem."

Another complicated process led by the state was the exchange of data between the organizations involved in the computer-based administration. The SEA provides student information to the systems for administration. These data move through the administration process and end in the results for students, schools, districts and aggregate reports for the state and federal government. Moving data and ensuring its quality takes leadership and subject matter expertise. The SEA designated one staff member as a subject matter expert, primarily responsible for ensuring proper data integration and quality. As these processes and systems were more complex than the systems for paper-based assessments, leadership from the SEA can help (or hurt) the technical implementation.

Support from the state contractor. The contractor's responsibility was to provide a helpdesk function to the SEA and district staff. Procedurally, they were expected to handle the volume of incoming calls. This was a challenge for the contractor in spring 2015. The contractor was overwhelmed in the first year and could not handle the volume of calls, which one interviewee described in this way: "What we heard from the field was that the help desk was not helpful… not timely and not helpful, and sometimes it was more blunt about [how] they actually were inaccurate, would give inaccurate information, which didn't satisfy customers." Yet, according to the district survey, districts relied on the state contractor less than the SEA perceived: 19.1% of district respondents stated they had little contact with the contractor despite the late documentation and the new assessment.

Other factors affecting student participation in SEA-centric state

Student participation in the computer-based testing was higher for elementary students than for high school students. Less than 2% of third grade students did not participate. Yet, despite the opt-out movement district survey respondents reported student participation as a little higher (53.3%) or higher (33.3%) in 2016 than 2015. Only 6% responded that student

participation seemed lower. Overall, district perceptions are consistent with my document analysis of state reports. High school students participated at the lowest rate in 2015 and slightly higher in 2016. Accordingly, these reports indicated that implementation was complete in the lower grades and incomplete at the high school. This data are also supported by interviews with SEA staff.

National and state policy effects on politics and subsequent effect on student participation

In SEA-centric state, the district testing coordinators were often pitted between parents and the state in the anti-testing environment. One interviewee said, "Teachers… had their cars painted with white paint… 'Boycott the tests.'" Many teachers and teachers unions campaigned against the tests because of anecdotal computer glitches and later than expected score reports. As described in Chapter 2, these local actors of the institution (i.e. the district testing directors and teachers) were caught between their responsibility to the organization that employed them and the community they served who were against the testing. These were influential groups and the legislature had hearings to better understand how the operational issues impacted the activities in the classroom.

The SEA described this lack of support from the public both nationally and in the states a heavy burden on the districts and the state. One respondent felt that many of the objections were not based on facts, from the score report turnaround expectations to potential poor student performance. The SEA tried to change these misconceptions by providing more information to the public. "We really… have been proactive, probably too late, certainly too late to have stemmed the opt-out movement." SEA staff conducted information sessions open to the public and accessible from anywhere in the state. The state and some districts committed resources to counter the anti-testing movement.

Some districts agreed with the SEA perspective. Two districts marked the support from all three stakeholders (i.e., student, parent and teacher) as "very challenging." In fact, both of these districts marked all issues as "very challenging". However, contrary to the SEA interviews about the 2015 administration, nearly half of the district survey respondents described support from the stakeholders as relatively smooth in 2016. Specifically, in response to the question, "how challenging was it to deal with the following aspects of the administration of the annual statewide accountability assessments this year," 47.7% perceived student support as "relatively smooth"; 43.9% did the same for parent support and 39.4% for teacher support . In fact, 16 of 65 district respondents (24.6%) who answered these three questions, marked "relatively smooth" for all three. .

Overall, both the SEA and the districts agreed the opt-out movement affected student participation. The SEA's perspective from 2015 differed from the 2016 district perspective in its belief about how challenging it was to overcome the issue.

The effect of technical implementation on student participation

No significant outages occurred in this state that impacted student participation. In the spring of 2015, the state's test administration went relatively smoothly. A respondent described it this way: "2015 was extremely stressful at the SEA, and in retrospect I think fairly successful. So we did have relatively smooth implementation with lots of challenges upfront." Another respondent described the implementation as complete because all participating students were able to test without any major problems.

> I think administrators probably feel like the test went pretty, [pause] not pretty well,
> but that it was okay and that it had first-year bumps, which is probably more aligned
> to how I feel about it. I mean I think, well, I'll start with me. I think my perception
> is for all the things that weren't in place when we got going, we came out okay… I

think some teachers might feel the same way as administrators of, 'Well, that wasn't

so bad,' or, 'I'm glad we participated in the field test because that helped.'

But another respondent acknowledged that not all stakeholders agreed.

What's most frustrating to me is that the teachers and the teachers union are

essentially campaigning against that story, and they're campaigning more on there

were thousands of glitches and everything that could've gone wrong went wrong,

didn't even get the scores back until October, which is not accurate because the

online scores from [test] were all available by July 1.

SEA staff was also mindful of the importance of the districts, schools, teachers and

students in the implementation. In the interviews, they referred to the state's ability to

implement the computer-based tests as dependent on teacher and administrator support. They

pointed to other states that experienced technical glitches during implementation, making it

impossible for all participating students to test. From their perspective, technical implementation

had to be done well so all students who wanted to participate were able to do just that.

Other factors affecting technical implementation in SEA-centric state

In SEA-centric state, three factors influenced technical implementation: SEA Procedures

and Practices; SEA-District Interactions; and SEA Capacity Building. All but one district

implemented the computer-based assessments for accountability in spring 2015. The district

survey respondents perceived the spring 2016 administrations as smoother in 2016 including the

speed of reporting and the parent, student and teacher support. One district respondent

commented in the survey, "This was year 2 of using the online test. There were far fewer issues

this year than last." C remarked,

Across the state five percent of students tested on paper, and there was only one

school district... that maintained the paper-based mode. So we had one holdout. All

the rest were smaller… a district will have a building that doesn't have reception

and they can't get it at the school, so they will participate with paper… That's just

the adult decision… we will always have that paper-pencil option for any student

with an IEP.

Some districts may have opted for paper for one or more of their schools, based on their

technical capacity. All districts have a paper-based option for individual students where the

Individual Education Plan (IEP) calls for paper-based tests. Technical implementation was

completed for all but one district out of the about 300 in the state.

       The effect of SEA-District interactions on technical implementation. The SEA-

district interactions most affecting the technical implementation included exchanging

information formally through trainings, informally through phone calls and emails and a network

of district testing directors. The SEA interviewees described their role as helpful in informally

answering questions from the districts, providing formal training and information distribution,

and enabling and encouraging the informal network amongst the district leads. The districts

agreed with the SEA on the value of the informal network of their peers. However, they did not

find as much value from the formal channels of training and chose to seek out information

independently from the Internet or other sources. A combination of these formal and informal

communications seemed to have helped district transition.

       Enabling and encouraging the informal network amongst the district leads. The

district testing directors were informally networked and actively shared information in what one

interview respondent called a "professional learning community," adding that "they do a lot

better job of being a professional learning community than we do." These interactions also

included some interfacing with technology coordinators for each district through the SEA

Educational Technology office. According to one respondent, "We work with the assessment coordinators and we try and make sure that those two people or divisions [are] connected at each school district." The SEA also promoted these networks as an informal medium for communication. Consistent with the SEA's efforts to develop informal support through learning communities, district survey respondents reported utilizing other less formal methods of information gathering with local tech coordinators (43.3%), school personnel (41.8%), and other district testing directors (27.3%), all of which were designated as critical sources by respondents.

Answering questions from the districts. The SEA staff supporting the districts described a close relationship with the district testing directors. They answered calls while balancing their workload and responding to immediate district needs. On interviewee stated:

> So my role is somewhere in between providing tech support and talking people off cliffs… just be real and go, 'Look, this is new. This is hard. It's hard for everybody. We're dealing with it. We'll figure it out,' is the exact kind of message that they needed to hear throughout the year, but that was the truth.

Another added, "I believe knowing that the state was doing everything they could, the state… believed that all the districts were doing everything that they could… [and] that it would all be fine. It took the pressure off." The SEA saw this relationship between the SEA and the districts as much a function of their ongoing and open communication as it was the trust districts had in state leadership and vice versa. The SEA believed districts trusted them to bring them through this transition.

Contrary to this view, only 22.73% of district survey respondents reported that the state was a "helpful provider" of all information. Being a "helpful provider" may mean a variety of things to different people. In this case the word helpful was meant to key off the perception the

districts had of how willing and able the SEA was to connect, communicate and aid the districts.

That said, the district survey respondents reported the state was a critical source of information

for most regulations such as compliance and accountability policies (31.34%), second most for

operational such as scheduling and testing windows (23.88%), and third most for technical such

as computer set-up and support (9.40%) information. This implies the districts value the

information from the SEA but wished for more helpful communications. In addition to the use

of the SEA as an information source, the district survey respondents found critical information

on the Internet (50.0%) and from the state test contractor (34.3%). I attribute the low helpfulness

of the SEA in part to the lateness of materials.

Providing formal training and information distribution. The formal communication

activities between the SEA and the districts included weekly newsletters and monthly webinars

that provided updated information. In the past, when the assessment program was stable, SEA

staff created annual one-pagers that listed changes from the previous year. But as one

interviewee described, "They were easy years." With the new tests, interview respondents said

they found repeating information through all formal and informal channels made the most sense.

As one explained, "Well, we talk about it. We put out articles. We put it everywhere. And then

when we get together with the districts in a week… say it again, and then say it again and then

say it again." These formal and regular communications were intended to let the districts know

they could count on the SEA.

However, district survey respondents reported that they struggled with the rollout in the

information provided (10.6%) and consistency in state direction (9.1%). Because the consortium

policies and procedures drove some of the operations, the SEA shared in that frustration. One

interviewee recalled, "I spent from September through the testing window apologizing for not

having materials in front of schools, and that was because the consortium was delayed in getting materials to the vendor. The vendor was therefore delayed in getting materials to us. We were therefore delayed in getting materials to the district." The districts felt the pain of these delays with one district survey respondent describing the impact, "Programs come online before training is available requiring districts to come up with their own training materials." It is likely these are the reasons the districts did not place as high a value on the formal activities.

Another respondent described the candid feedback received from districts after their first full year: "So after the 2015 administration, many schools said, 'Other than the late start, not having any of the information on time, not being prepared, it was the best [year] they had.'" Districts certainly had difficulty with the late and inconsistent communication, and this drove their perception of the value of the SEA's formal and informal communications. Despite these difficulties, districts were able to implement the technical solutions better than previous years.

The effects of SEA capacity building and school capacity on technical implementation. The SEA capacity building and school capacities had an effect on the adoption of computer-based accountability assessments but the SEA and district perceived differences in this capacity. In the SEA interviews, the dominant themes were school migration path and human and technical capacity. In the district surveys, the respondents agreed about the importance of the migration path, but perceived the technical capacity as inadequate to efficiently operationalize the assessments.

School migration path. Both the SEA and the districts agreed that defining the migration path from paper-based tests to the new computer-based assessments was a key collaborative element of the implementation process with one district survey respondent noting that the "state had a deadline, districts could move towards computers once they had infrastructure to do so."

Districts needed to consider a variety of factors in the development of their migration path, from the more obvious technical capacity to less obvious issues around parental and public readiness for the change. The SEA called for the change to the computer, involving schools and districts in the development of the migration path through the use of both paper and computer for a period of time. The SEA also worked with participating districts in the field testing to help the schools increase their local capacity. These are mechanisms designed to smoothly make the migration to computers.

In 2010, the SEA notified districts that they would be moving to computer-based assessments and that they would need to build the infrastructure to handle this. One interviewee pointed out that "after five years we had about 30 percent of the state participating, 30 percent of [our] students testing online." Consistent with the SEA, respondents described how the states, districts and schools all helped make the decisions on the migration paths for the districts and schools to move online. The state's timelines were aggressive in that districts would need to move to fully computerized testing within a couple of years based on the consortium timelines. In the end, the SEA gave a final incentive of cost (i.e. in 2016, computer-based is free but paper is for a fee) to drive districts to migrate to the online tests.

For those districts that took advantage of early adoption, an interview respondent described their experience as, "smoother than they had expected and smoother than we expected" while other districts less experienced with online testing had intermittent problems with students accessing the systems. The frustration among new schools that jumped into online testing without mindful preparation was described by one SEA respondent: "All of it was a challenge to get set up. Also it didn't stop there. The kids had a difficult time. The system would go down.

Kids were bumped off. So there were; so those schools that were moving from paper, all paper to online were very frustrated."

The district survey respondents indicated their implementation of online testing began in 2013, with 2015 reported as the first year for full implementation. Those districts participating in earlier trials (2013 and 2014) had an easier time than those who did not. For those participating in pilots and field tests for computer-based testing, a survey respondent explained:

Those districts that worked with the state from early on, they were the first ones to say… They said that it was the easiest engine to use, that the technology was great, that they didn't get bumped off, that no student was kicked out of a test session. We heard nothing but great things.

One district survey respondent described how their prior experience with online assessments made the transition smooth: "The first year [the consortium test] was offered we went online with it. Prior to that we were taking our state level tests online. So for our district, we were prepared for the online aspect of [the consortium test]."

Human capacity. The SEA and districts agreed on differences in human capacity to manage the administration at the school level. According to one interviewee, doing so was sometimes "a very large challenge for someone who is also the bus driver, and the gym teacher and the janitor." This variation in human capacity did not affect the technical implementation for about 300 districts, but it did contribute to preventing one district from implementing the tests.

Technical capacity. Where the SEA and districts differed was in the amount of technical capacity. The SEA believed that the districts had sufficient technology. However, as district survey respondents reported, they did not. The everyday technical capacity in the districts was lower than the SEA expected given its requirement that all testing to be done online. Only

54.4% of district survey respondents reported using computers often throughout the school year and 7.4% rarely used them. Similarly, only 66.2% of district respondents reported having enough or plenty of computers for normal everyday use. For the accountability assessments, 33.8% needed more computers or felt unprepared. All districts tested in a variety of places, including 11.76% utilizing offices or "arena style" in gyms and cafeterias.

The likely explanation of the SEA perceiving higher technical capacity at the local level is that because the state put in place communications and specifications for building the local capacity, they assumed the districts and schools built it before deciding to move online. In addition, the survey asked how districts "engage with outside organizations to get computers, tablets or other mobile computing equipment?" Respondents could select more than one source of funding. The majority of respondents (79.37%) confirmed their use of existing district contracts under their budgets for building capacity. Over a quarter (26.98%) identified other sources of funding from foundations, national programs, grants and levies to buy computing devices.

Concluding comments on SEA-centric state

In SEA-centric state, the SEA Procedures and Practice enabled the technical implementation while negatively impacting the politics and its effect on student participation. While the SEA worked hard to develop documentation, provide support via contractors, and communicate with districts and schools, some of the messages confused stakeholders and fueled the anti-testing movement. The graduation requirements, time spent on testing, and lack of utility in the scoring bolstered parents' arguments for opting their children out of the assessments. As seen in SEA-District state, SEA Factors had a dual effect: enabling technical implementation while negatively impacting the second indicator of statewide adoption, student participation.

Non-Consortia State

In this state, the education system spent a decade successfully migrating all schools to computer-based accountability assessments using their strengths in state leadership and acknowledging that capability needed to be built locally at a reasonable rate and funded accordingly. Their approach for flexible, long-term building of technical capacity was the opposite of SEA-District and SEA-centric states which relied on two national consortia to set timelines for implementation, regardless of district readiness and school capacity.

Technical implementation affected the extent of statewide adoption for Non-Consortia state, and student participation remained high, meaning there was no significant issue with students refusing to take the assessments. Technical implementation was enabled by building SEA and local capacity, strong and ongoing interactions between the SEA and districts, and the contractor support as an element of the SEA procedures and practices. The SEA and districts worked together over the course of ten years to implement the computer-based accountability assessments while facing the challenges of the opt-out movement.

Between 2013 and 2016, 99% or more of the students were tested in Math and English, and 97% or more were tested in other subjects. From my document analysis, having students opt out only affected performance data at the local level. In 2013, the SEA posted a letter to superintendents reminding them of the legal requirement for students to take the tests. For students who refused to test, their results were coded as "participating" for federal accountability and a "0" for performance. While this did not impact federal accountability reporting, the students who refused to test did not pass (citation redacted [6]), which negatively impacted student, school and district performance. In response to an increase in the number of students opting out (i.e., under 700 in 2013-14 to more than 2,000 in 2014-15 (citation redacted [7])), the state legislature passed a law in 2016 that allowed up to 5% of students to refuse to test without

adversely affecting school or district performance (citation redacted [8]). Based on this information, statewide student participation was not significantly affected by the politics and policies of the opt-out movement.

To better understand the scale of work in this state and use this successful adoption to inform other states, general state-level characteristics are worth describing. All data retrieved from IES NCES NAEP State Profiles data (NCES, 2017). In 2015, this state had over 1.2 million students in over 2,000 schools and under 150 school districts. Student performance was better than national average on the NAEP tests. Over half of the students were white. Approximately one-quarter were black and just over one in ten was Hispanic.   Almost 40% of students were eligible for free or reduced lunch and less than 8% had limited English proficiency. This state did not participate in consortia assessment activities but was active in the development of common standards for education, oftentimes drawing on their experience developing their own state standards.

In February 2013, I interviewed three staff at the SEA office and in March 2014, I distributed surveys to district testing directors. I sent over 100 email invitations and 52 district testing directors agreed to participate. In the next three sections of this paper, I use the data from these interviews and surveys to describe the role of the SEA in their statewide adoption of computer-based accountability assessments.

The big challenge in Non-Consortia state: Building SEA and school capacity

In this state, capacity building had a substantial influence on how districts administered the computer-based accountability assessments. The capacity at the SEA, district and school levels affected the technical implementation. There was a difference of opinion between the SEA and the districts on the topic of who had the decision rights for when the districts could

migrate to the computer-based assessments. The two groups shared opinions on the importance

of building technical capacity and using the technology for more than just assessments.

In Chapter 2, I represented my generic conceptual framework; Figure 4.3 below is a

representation of relationships among the framework's variables in this state.
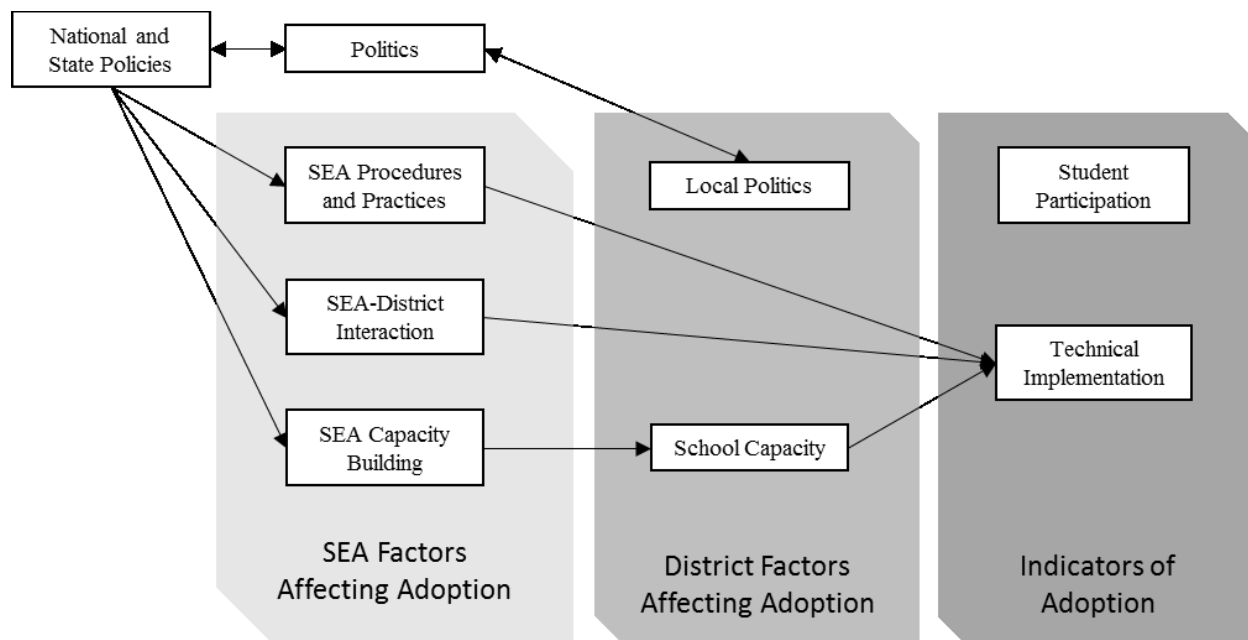
Figure 4.3. Conceptual framework applied to Non-Consortia state showing the effects found to

be present in this state.

All three factors, SEA Capacity Building, SEA-District Interaction, and SEA Procedures

and Practices, contributed to the technical implementation of the computer-based assessments.

National and State Policies had bidirectional influence with Politics and Local Politics. Student

participation was largely unaffected by the politics or Technical Implementation.

Five issues contributed to the success of the technical implementation and two issues

were important to student participation. They are outlined in Table 4.4.

Table 4.4

Issues affecting indicators of statewide adoption for Non-Consortia state.

Technical Implementation	Student Participation
SEA Capacity Building	National Policies affected Politics
• School migration path	• Anti-testing movement
• Technical capacity	Politics affected State Policy
SEA-District Interaction	• 5% legislation
• Informal communication and building relationships	Technical Implementation
• Formal training and information distribution	• No effect in this state
SEA Procedures and Practices	
• Contractor support	

This table will serve as an organizer for this state's case study. First, I describe the area where the state had the greatest impact in the statewide adoption of computer-based assessments: SEA Capacity Building. Next, I describe how the SEA-District Interactions and SEA Procedures and Practices enabled Technical Implementation. Finally, I walk through the bidirectional effects of National and State Policy and Politics.

Factors affecting technical implementation in Non-Consortia state

Technical implementation was a positive indicator of statewide adoption for this state. The SEA's extended migration path for schools and districts enabled them to build technical capacity and gave stakeholders time to transition to the computer-based tests. The SEA had strong relationships with the districts built over time through formal and informal interactions and the contractor support was a key contribution to the process for the districts.

Effect of SEA capacity building on technical implementation. Building capacity in the districts and schools was a high priority for the SEA. The state legislature funded technology purchases and the districts started with the higher grades and made their way down to the elementary schools over several years. This gradual approach meant districts phased in their online assessments as they gained experience and built the necessary technology solutions. Interestingly, it also led to the use of the computers in the classroom throughout the school year.

School migration path. A critical factor in the successful adoption was the SEA policy giving districts and schools the opportunity to define their own migration from paper to online testing within the milestones defined by the state. Interviewees described the ability of schools to build capacity over time, volunteer to be an early adopter, and chart their own schedules based on the technology and resources in place at each school. One respondent noted that early adopters had their own agenda: "Some superintendents that believed the handwriting on the wall that this is coming. And so if it's coming, we want a say in it and how it works. So let's get involved upfront."

Schools started at the upper grades and worked backwards, with appropriate accessibility and accommodations available for the students. One respondent referred to the process:

What we left them was bottom line... your high schools have to be ready by 2004, we'll say, and then 2006 for your middle, and then 2009 was the ideal when your high school, middle, and elementary had to be ready to go. So it was. You determine how to spend it, but these are the requirements that you have to be able to do.

Another respondent described district empowerment in this way, "But things have been available for a long time and so you would have [districts] who would go with one subject online. And they could choose the subject. It didn't matter to us." Overall, SEA respondents used terms like

"beef up your network" and "grown into the testing" as well as "phased it in" and "building a capacity to do it" to describe this gradual migration from paper-based to computer-based assessments.

Across the interviews, SEA staff also consistently explained that the state set a deadline for schools to convert to computer-based assessments but the districts selected the year when they were to be prepared for the assessments. According to one interviewee, "We have been able to kind of sit back and let them dictate the pace at which they moved." Another described how districts spread the word about the benefits of migrating: "We didn't demand that anybody do online testing. We said, 'You have to start building a capacity to do it.' And then it really was by word of mouth. 'Hey this is the great, and the kids like it.' That it started to expand." According to another, those teachers who resisted the change did so out of concern for students in underserved populations:

> We still have a lot of teachers who believe that LEP students or special ed [sic] students, disadvantaged students are just not familiar with computers, so they're very apprehensive of -- my students don't have computers at home, they're going to be disadvantaged by taking this test online. So there's some of that barrier to break through even though everybody's known for five, six years that this was the deadline that everybody's testing online.

However, data from the district survey reveal a different perception about the level of district control. Twice as many district survey respondents (44%) indicated that the state chose when the districts would migrate to computer-based assessments. Only 22% indicated that the districts chose. When asked whether more than one group could decide, 32% of survey respondents indicated that the state had an influence along with the district, the school or both.

One respondent reported that the school could choose. Clearly, the SEA believed they were putting migration choices in local hands but the districts reported the opposite.

Technical capacity. During the interviews, SEA staff described a deliberate build out of physical capacity at the local level so that when the districts migrated to computers, they would have the technical capacity to be successful. One SEA interviewee described this capacity building: "The network capability, number of machines... [districts] were given state money, and they were to have it all in place." By using state funds to build bandwidth with Internet Service Providers (ISPs) and supply the computers, the SEA perceived that they had provided the support schools needed to administer the assessments. Districts were able to buy technology capacity for assessments as well as every day teaching and learning. Another respondent added:

> A lot of states will say, 'Well, you give your districts money.' It's like, well, not specific for testing or for this. It was money that we were fortunate that legislature was providing in the first place. We just targeted it to this. And we didn't target it just to assessment, we said [sic] then that was another part of this initiative in the beginning that it was really, it was a web based initiative is what it was called. So we were putting the infrastructure in place, high-speed networks for testing. But during the rest of the year, it was also to be used for instruction and mediation.

The district survey responses indicate these state programs for building capacity were successful. Almost all district respondents (96%) reported that they had enough or plenty of bandwidth during annual assessments while 68% reported that they had enough or plenty of equipment to conduct online assessments as a normal practice of teaching and learning. Additionally, 84% of the responding district testing directors used online testing throughout the year for interim or formative assessments. All respondents procured equipment through district

contracts with two exceptions citing state programs for funding computers and tablets. Specifically, 96% of district testing directors who responded to the survey indicated that they used district sources for the acquisition of computers and tablets. In addition, 12% of respondents reported utilizing national programs and 20% benefiting from local school foundations either alone or with other sources.

Similarly, 89% of district survey respondents reported that the tech support for the annual assessments was sufficient. Staying current was a problem as 47% of the survey respondents indicated that their equipment either needed upgrading or they needed more equipment. Overall, these results show how the districts were well-equipped for the annual testing and conducted testing in multiple places. The majority of respondents reported using the computer lab (98%), the school library (80%), and the classroom (87%). Only one district reported doing all of their testing in the classrooms. Thus, both the districts and state staff had the same perception that district capacity was sufficient for the migration to computer-based accountability assessments.

Effect of SEA-District interactions on technical implementation. The interactions between the SEA and districts were both formal and informal. The informal communication proved to be important for both the state and the districts. The SEA also conducted formal training sessions where the districts shared their experience with the SEA while the SEA updated the districts on advances in the technology or changes in procedures. These formal and informal interactions built relationships and enabled the test administration.

Informal communication and building relationships. The SEA described close and trusted relationships with the district testing directors. Discussing the communication between the states and districts, one interview respondent stated that "if [districts] don't do well, then

we're not going to do well."   Another went on to extend the importance of bidirectional communication:

> I really think the biggest thing was the relationships that you develop in the field -
> - so it wasn't even so much as in was there someone back here I could call, but it
> was, what I was hearing from someone in the field and I could share that with
> someone else. So that, that flow of information was important.

Similarly, a third interview respondent added: "You have to have good people there and I think the relationship that we have… with our [district] directors of testing is unique because there's a pretty comfortable dialogue... They don't mind calling us and talking to us." All the interviewees described how districts supplied information to them regularly which helped them understand the technology from the user perspective.

During the interviews, SEA staff described their role as very important to the districts, and the districts responded similarly in the survey. Of the district survey respondents, 39% saw the SEA as a helpful provider of all information while only 20% saw the SEA as a regulator. The survey results also indicate that the SEA was considered critical for regulatory information by 70% of survey respondents and nearly half of the respondents also reported that the SEA was critical for technical and operations information as well.

Formal training and information distribution. All SEA interview respondents believed the trainings and information distribution were very critical to the success of the test administration. One interviewee described what it was like in the beginning and how it affected districts: "At the very beginning when it was [SEA staff] going out on the road... that set the stage for people to not want to kill us every time something goes wrong. And I think that's huge." Another explained the significance of the trainings the SEA provided:

> We used to do local trainings… we'd try to hit all the different regions, and do
>
> multiple trainings throughout the state. When… we would go to sites, and we
>
> would offer two or three per region across the state, and we would do hands-on
>
> training. We'd go in their labs. We'd set them up and we'd be right there.

A third added: "If there were seats and they wanted to come, we let them come. And we figured

the more information we could get out there, the better."

These formal trainings were also a great forum to further develop relationships and

inform the district testing directors. According to one interviewee, "Those two big meetings in

the fall and in the spring are the primary opportunities to be in front of the [district testing

directors] and talk to them… And it's gotten pretty strong reviews. They like it."

Effects of SEA procedures and practices on technical implementation. The

procedures and practices at the SEA for contractor support, including documentation and

technical and operational research, affect the technical implementation. The SEA and districts

expressed varied perspectives on the value of the contractor support. The SEA did not rely on

them and was not aware how much the districts valued their support. The districts may not have

known how much review and quality checks the SEA conducted in the development of this

support and this may account for the differing perspectives.

Contractor support was mentioned often in the interviews, but usually referenced as not

important. One interviewee explicitly described not going to contractors for information: "I do a

lot of web based research myself." While the contractors provided the state with specific

technical training, the interviewee explained that "[SEA staff] do more of the policy, whereas

[the contractor] covers the how to, and how to use [the system], how to set up your proctor

caching, how to determine if your machines are capable of running tests now." Another

explained that communication with the [district testing directors] was too important to leave to the contractor: "We review pretty much every communication that comes from [the contractor] to our [district testing directors]. We don't let things go to the [district testing directors] that aren't pretty well polished."

Interview respondents shared that they informed themselves about technology so they could implement innovative solutions. Administrators used Google and other web-based tools for research. They did not trust their contractors and technology suppliers to give accurate and timely technical information other than specific system functionality. One respondent explained how quality issues led to them bringing the Helpdesk function back to the state: "We went through a nightmarish time of even reviewing all of the knowledgebase articles that our contractor's helpdesk was using because they were just giving bad information." The respondent went on, "They know their product; they don't necessarily know how [our state] interacts specifically with the product." Another respondent added that the SEA did not seek out other suppliers for industry knowledge, just their systems-related information. In one instance, as described by an interviewee, the technology supplier "wasn't telling people that they were blacklisting that version" and another "wasn't being real. They're not real forthcoming with their information."

The survey data conflicted with the SEA staff description of the impact of the contractor on the successful implementation of computer-based assessments. District survey responses showed 74% of district testing directors often or sometimes were in contact with the contractor for support and 68% of respondents indicated that the contractor was a critical source of information for the annual accountability assessments. There was one comment in the SEA

interviews explaining this disconnect: "The [contractor] trainings… those are to hit… the school level folks."   The districts found more value from the contractor than the SEA expected.

Factors affecting student participation in Non-Consortia state

In this state, the student participation was not significantly impacted by technical implementation (i.e. no major outages) or by politics and policies. There was an influence of the opt-out movement in the news and public discussion, but this did not result in large numbers of students refusing to be tested in 2013-14 when these data were collected. At that time, the student participation was over 95%.

National and state policies effect on local politics. SEA and district staffs did not see the environment as having an effect on how statewide computer-based accountability assessments were adopted. In this state, the state policy was to develop their own assessments and they pride in the decision not to use consortia assessments. National and state policies affected the need for K12 computer-based accountability assessments, but not how they would be implemented. During the SEA interviews, the staff described an environment with some influence over the implementation of these assessments. The survey results supported this SEA view with the national policies and parent organizations seen as not critical sources of information for the annual assessments. Neither the state nor the districts reported political factors as significantly influencing the adoption of the computer-based accountability assessments.

Politics effect on state policies. The state legislation responded to the possible drop in student participation with legislation that described how the state would deal with student refusals in excess of 5%. Specifically, students who refused to be tested would not be given a "0" score when calculating school performance unless the school didn't meet its participation

rate as required by the state or nation (citation redacted [9]). This legislation allowed schools to avoid being penalized as long as their student participation was 95% or higher.

Concluding comments about Non-Consortia state

In the Non-Consortia state, the SEA's role in statewide adoption of computer-based assessments for accountability was focused on building the capacity for implementation through increasing the technology capacity and allowing a locally-defined migration path from paper to computer. In spite of politics, the SEA kept student participation up and had a successful adoption.

Non-Consortia state is a model for measured progress towards an institutional adoption of an innovation. In the previous two cases, SEA-District state and SEA-centric state, the consortium developed the migration plan at a multi-state level. Neither state was able to build capacity over time and subsequently ran into problems with politics having an effect on student participation. SEA factors contributed to the anti-testing movement and drove down the statewide adoption, despite a successful implemetation.

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Cross-State Comparison

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In this section, I look across all three states at the document and survey data to understand the similarities and differences between the states. The most significant findings are as follows:

- Consortia states had lower student participation and districts who felt less supported

- The state most challenged with SEA-District interactions had the most districts

- Districts in the SEA-centric consortia state felt more independent; and

- Districts had enough technical infrastructure for testing.

These are discussed in more detail in this section with highlights from the district survey results.

Student participation

Looking across public documents from the three states, several comparisons emerged for student participation.   First, student participation at the high school level was a significant issue for the two states that participated in consortia assessments than the Non-Consortia state. SEA-District and SEA-centric states implemented the assessments over a shorter period of time and unlike the Non-Consortia state, both consortia states faced greater opt-outs by students which decreased their student participation indicators. These opt-outs likely were caused by many issues in politics. For all three states, there were concerns about the federal role in accountability. In the consortia states there were also concerns about the state use of student scores for teacher evaluations, the change to CCSS, and the adoption of assessments designed by a national consortium, among others. Despite good technical implementation, these added issues help explain, at least in part, why the two consortia states had lower student participation (see Table 4.5).

Table 4.5

High school student ELA participation rates across all three states

	SEA-District State	SEA-centric State	Non-Consortia State
2013	>99%	-	-
2014	-	-	>99.9%
2015	≈ 67%	≈ 50%	>99.8%
2016	≈ 75%	-	-

Note: Data are rounded to preserve anonymity. A "-" is used when data were not available. Citations redacted [2, 3, 4 and 6]. These redacted data sources are the SEA state accountability assessment reports where the aggregated student performance is posted annually on the SEA website for the public.

There are similarities with the active anti-testing movement in each state and differences with how the states handled the movement and how they communicated to stakeholders. The

Non-Consortia state had political opposition to testing but it did not result in the high rate of refusal the other two consortia states experienced in their high schools. The Non-Consortia state's response to the anti-testing movement was to create consequences for local communities if participation dropped below 95%. The two consortia states, on the other hand, had trouble with inconsistent or incomplete information on operational scheduling, time spent on testing, graduation requirements and turnaround time which only fueled the anti-testing movements in their states. Table 4.6 illustrates these comparisons.

Table 4.6

Three state factor comparison: Effects on student participation

	SEA-District State	SEA-centric State	Non-Consortia State
SEA Factors	SEA Capacity Building • Operational scheduling • Time spent on testing (capacity-related) SEA-District Interaction • Communications	SEA Procedures and Practices • Confusion over graduation requirements • Time spent on testing (procedural) • Turnaround time for results	
Politics	National and State Policies affecting Politics • Anti-testing and social media	National and State Policies affecting Politics • Mobilization of the anti-testing movement and anti-consortia advocates	National Policies affected Politics • Anti-testing movement Politics affected State Policy • 5% legislation
Technical Implementation	No effect due to outages since makeups occurred for the one-day outage	No effect in this state	No effect in this state

Technical implementation

Comparing the factors that affected Technical Implementation, there are similarities and

differences with how the SEA supported district migration from paper to computer-based tests

for accountability. Contractor support, state leadership and documentation were all key elements

of the SEA Procedures and Practices that enabled the adoption. In the SEA-District Interactions,

all three states found that good relationships, responsiveness to questions, and proactive training

were helpful to a successful technical implementation. Building SEA and local technical

capacity was considered to be an important step in preparing for the switch from paper and

pencil to computer-based tests.

One interesting difference in these factors was that the SEA for the Non-Consortia state

considered the most important relationships to be between the SEA and the district. Whereas the

SEA-District state, which had the most districts to interact with, used consultants in critical

districts, and the SEA-centric state encouraged districts to network for support. In delegating

communication to consultants and peers, the two consortia states may have provided less support

to districts through the transition. Although this did not impact the technical implementation, it

may have led to some miscommunications with this whisper-down-the-lane approach (i.e. where

the SEA talks to the consultants who in turn talk to the districts or where the peer network for

district testing directors share information with each other.) Table 4.7 highlights these

differences.

Table 4.7

Three state factor comparison: Effects on technical implementation

	SEA-District State	SEA-centric State	Non-Consortia State
SEA Procedures and Practices	State leadership in the consortium Accessibility Digital Natives Contractor support and documentation	Documentation State leadership Contractor support	Contractor support
SEA-District Interaction	Answering questions Regional training Consultants into schools	Enabling and encouraging the informal network amongst the district leads Answering questions from the districts Providing formal training and information distribution	Informal communication and building relationships Formal training and information distribution
SEA Capacity Building	Technical capacity	School migration path Human capacity Technical capacity	School migration path Technical capacity

There are three cross-state findings for the indicator of Technical Implementation: (a) district challenges for the two consortia states; (b) districts perceptions of independence in decision-making for the "SEA-centric State"; and (c) SEA factors.

District challenges in the technical implementation. In the revised district survey for the two consortia states (as detailed in the Method section), I added survey items to better understand the challenges the district testing directors faced as they rolled out computer-based assessments. Detailed survey results are described in Tables 4.8 and 4.9 which show responses question 25, "How challenging was it to deal with the following aspects of the administration of the annual statewide accountability assessments this year?"

Table 4.8

SEA-District state survey results

SEA-District State	Relatively Smooth (1)	Periodic challenges arose (2)	Some challenges (3)	Very challenging (4)
Time spent on testing	26.36%	22.73%	30.00%	20.91%
Speed of reporting	36.45%	14.02%	24.30%	25.23%
Utility of test scores	28.30%	19.81%	37.74%	14.15%
Consistency in state agency direction	29.63%	30.56%	26.85%	12.96%
Staff preparedness	52.73%	26.36%	19.09%	1.82%
Parent support	28.70%	37.96%	26.85%	6.48%
Teacher support	54.21%	23.36%	17.76%	4.67%
Student support	52.83%	23.58%	17.92%	5.66%
Information provided	36.79%	28.30%	30.19%	4.72%

Table 4.9

SEA-centric state district survey results

SEA-centric State	Relatively Smooth (1)	Periodic challenges arose (2)	Some challenges (3)	Very challenging (4)
Time spent on testing	10.61%	19.70%	39.39%	30.30%
Speed of reporting	53.03%	18.18%	22.73%	6.06%
Utility of test scores	28.79%	28.79%	31.82%	10.61%
Consistency in state agency direction	24.24%	45.45%	21.21%	9.09%
Staff preparedness	21.21%	37.88%	36.36%	4.55%
Parent support	43.94%	40.91%	12.12%	3.03%
Teacher support	39.39%	37.88%	18.18%	4.55%
Student support	47.69%	33.85%	15.38%	3.08%
Information provided	22.73%	36.36%	30.30%	10.61%

I shaded the cells in the tables from which I drew a few highlights, starting with challenges and ending with what went smoothly:

- Both states found the time spent on testing and the utility of test scores to be challenging.

- Both states found some challenges with the consistency in state direction and in the information provided.

- Staff preparedness was smoother in SEA-district state than in SEA-centric state.

- Speed of reporting was smoother in SEA-centric state than in SEA-district state.

- Both states found student, teacher and parent support to be smooth.

Possible explanations for the challenges in these two states are the anti-testing movement and SEA involvement in the consortia. An explanation for the challenges with the time on testing and utility of scores was the pressure from the anti-testing public to find value in these new assessments. An explanation for the challenges in state direction and information provided was the development of the assessments and procedures at a consortium level rather than at the state level where the SEA would have been more familiar with and more in control of information, as they had been in the past.

District perception of independence. The district survey asked three questions to understand the perception of the district in its ability to make decisions locally: who decided when to move from computer to paper; time spent locally in support of the assessments; and support from the contractor. In the district responses, the SEA-District state and the Non-consortia state were more similar than the SEA-centric state. The detailed survey results are in Table 4.10.

Table 4.10

District survey results for differences between SEA-centric state and the other two states

Question	Answer	SEA-District State	SEA-centric State	Non-Consortia State	F
11) For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), could schools or districts choose when they convert to the computer-based tests? (you may check more than one box)	"The state told us when to move from paper tests to computer tests."	86.32[a]	42.65[d]	73.91[e]	23.937***
13) For the annual assessments, what % of time does the district tech director spend supporting schools for computer issues?	"50-75%" or "More than 75%"	39.47[b]	11.76[d]	34.78[e]	8.370***
16) For the annual [accountability] assessments, how much support does the division get from the contractor for the testing?	"There is no real contact with [the contractor] in my division or its schools."	8.77[c]	19.12[d]	2.17[e]	4.682*

Note: Percentage of respondents in each state selecting the answer(s) specified. A series of three one-way ANOVA's were run to compare state level responses for each of the relevant questions. See Appendix E for the statistical output.
[a]n=117. [b]n=115. [c]n=114. [d]n=68. [e]n=46.
*$p < .010$. ***$p < .000$.

Highlights of the results from district responses to these questions:

- Compared to the SEA-centric state, the SEA-District state and the Non-Consortia state districts responded at double the percentage that the state mandated the migration plans to move to computer-based assessments.

- SEA-centric state's district respondents had less contact with the state contractor for support than in the consortia state.

- SEA-centric state district tech directors spent less of their time on supporting the assessments than those in the other two states.

One explanation may be that for the SEA-centric state, there was less reliance on central support and decision-making than in the other two states. District administrators in the SEA-District state and the Non-consortia state believed the state told them to convert to computer-based tests so they may have relied on institutional support through the contractor and the district tech coordinators more than in the SEA-centric state where districts felt more independence in decision-making and implementation.

SEA factors affecting technical implementation. I compared the responses from the districts across all three states on the three SEA Factors affecting technical implementation. I found the SEA Procedures and Practices were more challenging for the consortia states; the SEA-District Interactions were most challenging for the state with the most districts; and all three SEA Capacity Building efforts increased school capacity to sufficient levels for the Technical Implementation.

SEA procedures and practices. The SEA Procedures and Practices were more challenging for districts in the consortia states. In SEA-District and SEA-centric states, the district survey data suggest both consortia states consulted with the contractor less, found the SEA to be less critical for information, and were less likely to use online testing throughout the school year. Comparing the district testing directors survey results from the non-consortia state to the consortia states, the Non-Consortia state generally was more positive about the SEA role and help from the SEA and contractor. The details of the response rates are shown in Table 4.11.

Table 4.11

Differences in consortia and non-consortia states

Question	Answer	SEA-District State	SEA-centric State	Non-Consortia State	F
2) Generally, does your district use online testing throughout the school year for interim or formative testing?	"Daily" or "Often"	47.06[a]	54.41[d]	84.00[f]	10.696***
20) How important is the SEA as a source of information for the annual assessments for accountability?	State is critical for Regulatory	41.44[b]	31.34[e]	69.77[g]	8.648***
	State is critical for Technical	12.73[c]	19.40[e]	39.53[g]	7.322**
	State is critical for Operational	18.18[c]	23.88[e]	50.00[h]	8.635***
21) How important are other sources of information for the annual assessments for accountability for regulatory, technical or operational issues?	State contractor is "Critical"	37.96[c]	34.33[e]	68.18[h]	7.693**

Note: Percentage of respondents in each state selecting the answer(s) specified. A series of five one-way ANOVA's were run to compare state level responses for each of the relevant questions. See Appendix E for the statistical output.
[a]n=119. [b]n=111. [c]n=110. [d]n=68. [e]n=67, [f]n=50. [g]n=43. [h]n=42
**$p < .001$. ***$p < .000$.

One explanation for these results is the Non-Consortia state built infrastructure within the state and over time while the consortia states relied on a quick implementation with one of the multi-state consortia. In the Non-Consortia state, districts were used to supporting the effort by navigating the documentation and calling on the contractor and the SEA when they needed more help. Moreover, because the technology was built over time, the schools may have been able to

integrate computers into their everyday classroom activities as opposed to the consortia states who procured these computers too quickly to have them routinized in the curriculum.

SEA-District interactions. This factor was most challenging to the state with the most districts. In looking at the public documents on state demographics, as shown in Chapter 3's Table 3.3 and repeated in Table 4.12, the similarities and one difference emerge. All three states performed better than average on NAEP. Their student populations were between 1.0 and 1.4 million students and they each have between 2,000 and 2,500 schools. All three states had less than 8% limited English proficiency and 35-40% of students were eligible for free or reduced lunch. Close to 60% of the students were white in all three states. However, there was a substantial difference between in the number of districts across all three states, as Table 4.12 illustrates. The state most challenged by SEA-District interactions had four times as many districts than the least challenged non-consortia state.

Table 4.12

Demographics for selected states (also shown in Chapter 3 Table 3.3)

	Category 1 State	Category 2 State	Category 3 State
Consortia state	No	Yes	Yes
NAEP	Above average	Above average	Above average
# students	1.2 million	1 million	1.4 million
# schools	2000	2000	2500
# districts	150	300	600
LEP	8%	8%	4%
Free/reduced lunch	40%	40%	35%
Portion white	50%	60%	50%
Next ethnic group	Black	Hispanic	Hispanic and Black

Note: Data are rounded to preserve anonymity.

One explanation for these results may be, simply put, that communicating with more districts is more difficult for the SEA. As described earlier, the state with the most districts assigned consultants for key districts in an attempt to provide them additional support and the state with the second most districts encouraged a peer network among the district testing directors. Both approaches were less successful than the state with only 150 districts which focused on developing personal relationships with each coordinator.

SEA Capacity Building. Finally, the data from the district survey respondents suggest that local capacity was sufficient in the districts. The district respondents from all three states consistently reported they had enough technology infrastructure (e.g. equipment, tech support, bandwidth) to support annual computer-based accountability assessments. In addition, more than two-thirds of district survey respondents reported that they had enough equipment to utilize it in everyday teaching and learning. For the annual assessments, 88-96% had enough bandwidth and about 50% had enough computers with the right software. Only a quarter of respondents answered that "schools could use more up-to-date computers." The detailed survey results are in Table 4.13.

Table 4.13

District survey results for technical infrastructure

Question	Answer	SEA-District State	SEA-centric State	Non-Consortia State	F
3) Generally, do you feel you have enough equipment and support to do online assessments of your students as a normal practice in teaching and learning?	"Plenty" or "Enough"	73.11[a]	66.18[d]	72.00[e]	0.519
8) For the annual assessments, does your district have the bandwidth to run the testing?	"Plenty" or "Enough"	96.62[b]	88.23[d]	95.75[f]	2.873
9) For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), how well prepared are the schools with their equipment?	"There are enough computers with the right software."	58.47[b]	41.18[d]	53.19[f]	2.621
	"Schools could use more up-to-date computers."	22.03[b]	25.00[d]	29.79[f]	0.550
	"Schools need more computers."	19.49[b]	32.35[d]	17.02[f]	2.604
	"Schools are unprepared."	0.00[b]	1.47[d]	0.00[f]	1.215
12) Did the schools invest in new technologies like tablets that are not compatible with the testing software for the annual accountability assessments?	"Some of our new devices won't run the software."	2.56[c]	1.47[d]	45.65[g]	51.883***

Note: Percentage of respondents in each state selecting the answer(s) specified. A series of seven one-way ANOVA's were run to compare state level responses for each of the relevant questions. No significant differences were observed for questions 3, 8, and 9. See Appendix E for the statistical output.

[a]n=119. [b]n=118. [c]n=117. [d]n=68. [e]n=50, [f]n=47. [g]n=46.

***$p < .000$.

From these data, I conclude schools had enough technical infrastructure for annual computer-based assessments because the SEA, districts and schools were able to build sufficient local capacity. There was so much attention on building the technical capacity in the schools, including states funding technology initiatives and organizations like Consortium for School Networking (CoSN) and the Council of Chief State School Officers (CCSSO) publishing guidelines and interactive tools. With sufficient capacity the SEA did not inhibit either indicator of adoption. The students were able to participate and the SEAs had successful technical implementations. Generally, the districts were prepared for the annual testing. As we move forward in time, local investment and control of infrastructure will need to keep pace with the technology advancements for the testing software.

One difference in Table 4.13 was where 45% of the Non-consortia state's district survey respondents reported that their new devices could not run the old software for annual testing. This means that their technical capacity outpaced the testing software's ability to keep up their compatibility. Notably, only one to three percent of non-consortia districts had this problem. A likely conclusion is that some districts in the Non-Consortia state were able to continually invest in new technologies while others may have held back the testing software from utilizing these technologies. This is a familiar problem in the industry where all students must be tested in the same way but some districts have lower technology infrastructure investment. In the Non-Consortia state, most of the technology infrastructure was built in concert with the testing software so the same dynamic will likely repeat over time. Some districts will outpace others in their continual investments.

Concluding comments about the cross-state comparison

In comparing data across all three states, significant differences and similarities were found that will inform future innovation adoptions. Student participation rates were lower in the

consortia states, especially for high school students, due to a combination of national and state policies and their effect on politics. The technical implementation went well in all three states due in part to the building of technical capacity in the schools. But the districts in consortia states faced challenges with the time spent on testing, the utility of test scores, and the lack of consistency in state direction and information provided. The districts in one consortium state felt more independent possibly because they perceived they had more decision-making authority around the migration from paper to computer. Consortia states faced greater challenges in their procedures and practices and one of these states faced additional challenges with communication to their many districts.

CHAPTER 5: DISCUSSION

In this chapter, I reflect on this work and describe the journey the study has been for me. I discuss what proved out in my conceptual framework, propose areas for future research, and finally consider implications for policy and practice.

My study's four-year journey

What did I set out to do? I set out to understand the institutional adoption of innovation and what the top of the hierarchy can do to enable or hinder that adoption. Technical innovation adoption is pervasive in today's world with consumers driving technology development and purchasing technical products. As individual consumers, adoption decisions are based on the utility for each person. Once we look at an organization, the adoption of technical innovation can be driven down through the institutional hierarchy but in the end, that hierarchy needs to develop the support of its members. My initial approach was to understand how that organization can support the members in the adoption of a technology innovation.

What did I do? I designed a study looking at how K12 schools adopt innovations led by the SEA. The hierarchical relationship between the SEA and the school districts allowed me to explore how the SEA could support implementation at the school level. I focused on the adoption of computer-based assessments for accountability because that gave me the view from the SEA to the schools and allowed me to see how this implementation was done. The impending consortia assessment rollout in 2014 offered an ideal view into innovation adoption: students were required to take these tests so the organization (i.e., the SEA down to the schools) needed to work together to implement the innovation. I built a conceptual framework to account for factors within the organizational hierarchy of the SEA that could affect the technical implementation with the district as the unit of adoption. Notably, my conceptual framework did not initially consider the student as a unit of adoption since I (and the SEA) viewed the

requirement for students to participate as a given. I focused on the hierarchy of the organization, applying two models to this adoption: diffusion of adoption and policy implementation.

What happened along the way? The technical implementation of K12 computer-based accountability assessments turned out to be just a part of the story—the easier part. In spring 2015 when I had my committee meeting, the national opt-out movement was in the headlines. Despite the fact that the tests were mandatory, students were refusing to participate en masse across the country. The consortia and its member states were so focused on technical implementation in their first year of operational testing; they were unable to prevent the public outcry from significantly impacting student participation.

The opt-out movement became the elephant in the room for this study. The SEA kept to the technical implementation—the procedures and practices, the SEA-district interactions and the building of capacity. They were focused on making sure their side of the boat did not sink. So the elephant moved from being in the room to being in the back of the boat, as shown in Figure 5.1.

Figure 5.1. "At least my side isn't sinking!" is my drawing, depicting the view of the SEA in

successfully implementing the technical solution while the public was sinking the boat with their

objections and non-participation of the students.

The students, who are outside the organizational hierarchy, and teachers, who were on the

fence with one foot in as an employee and one foot out as a citizen, obstructed the adoption with

protests, refusals to test, and union opposition. As individuals, they acted outside of the

organizational hierarchy and had a significant impact on the adoption. Most implementation

models, however, ignore those outside of the organization, focusing on the people executing the

change and not those affected by it.

So then what did I do? I added a second indicator of adoption to my framework—student

participation—to reflect this unit of adoption and understand their impact on adoption. Students

are not responsible for the technical implementation but without their compliance, the change to

computer-based assessments is moot. Because in the end, the adoption of a new technology or service in public policy is only successful if people participate and the public good is realized.

Reflections

In the three states in this study, the technical implementation went well with one exception. In the case of the "SEA-District State" they experienced an unplanned full day outage in spring 2016. This outage quickly made it to the press and the SEA performed a full review of the problem. But, due in part to the work the SEA did to prepare for testing, they bounced back quickly. The media reported the following: "On [the next day], schools resumed testing without any reported problems, said an education department spokesman who called it a 'routine day of statewide testing.'" (citation redacted [10]).

However, for some other states in 2015, the technical implementation did not go well. Three Smarter Balanced states—Nevada, Montana and North Dakota—contracted with Measured Progress who had difficulty administering the assessments using the Smarter Balanced Open Source Test Delivery Engine and all three states stopped testing (Molnar & Ujifusa, 2015). This technical problem was highly publicized, shown in Table 5.1, and resulted in legal problems for the contractor.

Table 5.1

Publicized implementation problems in NV, MT, ND in spring 2015 (Schaeffer, 2016)

State	Article	News organization	Date
NV	"Clark County Suspends Testing Indefinitely"	Las Vegas Sun	April 23
NV	"Common Core Test Crashes Again on First Day Back"	Associated Press	April 20
NV	"Breach of Contract Declared After Common Core Testing Crash"	KOLO-TV	April 21
MT	"Montana Lets Schools Cancel Smarter Balanced Testing After Technical Woes"	Education Week	April 15
ND	"More Glitches Plague Standardized Tests"	Bismarck Tribune	April 15

For student participation in 2015 and 2016, two of the three states in my study had challenges resulting in more than 25% of high school students refusing to take the tests. As the change was pushed down from the SEA, the public interest of students and parents pushed back up through the teachers and administrators. Students did not see any benefit in sitting for the tests, especially high school students who feared missing time in the classroom to prepare for AP exams and finals. The students who chose to opt out saw very little advantage in participating.

Other states faced similar challenges with student participation. In December 2015, the U.S. Department of Education "identified 13 states (less than one quarter of jurisdictions) as having missed the 95% participation requirement in the 2014–2015 school year… In sum, the sources cited above suggest that significant levels of nonparticipation were restricted in 2015 to a minority of states and, except for New York, Colorado, and Rhode Island, to relatively small subsets of their eligible test-taking populations." (Bennett, 2016). Non-participation decisions were made by the students with permission from their parents and in some cases supported by the local community, including teachers and school administrators.

In my local public school district, the superintendent published a letter in advance of the

spring administration in 2015 that referenced a protocol for opting out.

"Princeton was one of the first districts in the state to provide a protocol for parents

regarding test refusal. We did this because we recognized that a sensible, fair and child-

centered set of protocols for those parents who chose not to have their child tested was in

the best interest of all students… Teacher advocacy groups across the state have also

viewed the test negatively based on concerns as to how the results may be used in the

teacher evaluation process… On a practical level, the PARCC assessment, while

mandatory, is not a hard and fast graduation requirement for those students currently in

high school." (Cochrane, 2015).

This conflict between state-mandated testing within the hierarchical organization and the push

back from the local community, teachers, and districts made student participation the bigger part

of the story.

Interestingly, change management research usually focuses on activities within an

organization where there is a hierarchical relationship. The authoritative decision-making

process asks all members of the organization to adopt the changes and often identifies some

consequences for not doing so. As described earlier, the hierarchy of the institution in this study

started with the SEA and moved down through the district administration, district testing

directors, school administrators, and teachers. Students, however, were outside of that

organizational hierarchy and in this study, were not subject to consequences for their refusal to

participate. Even those SEAs that tried to demonstrate their authority by making the tests

mandatory for graduation were met with resistance from the community. This non-compliance

of the community affects the extent of adoption. The districts and schools under the SEA may

completely nail the technical implementation but in our culture of democracy and free will, students and parents cannot be compelled to participate. Without student participation, the innovation falls flat. The tree falls in the forest but no one is there to hear it.

Key Findings of the Conceptual Framework

Looking at my Conceptual Framework and the findings of this study, the Conceptual Framework proved out some effects on the Technical Implementation and Student Participation while revealing some unforeseen effects between the SEA Factors and these indictors.

What proved out from the conceptual framework? Both technical implementation and student participation mattered. The SEA contributed to the adoption of K12 computer-based accountability assessments and the success indicators were found in both in the technical implementation and student participation. What is less clear in my framework is how networked the effects are and whether all of them are bidirectional. Applying my framework to more cases would help clear up these questions.

Technical implementation matters. Generally, focusing on technical implementation in an innovation is a natural place to put resources and attention for the technically-oriented team responsible for implementing the innovation. It is necessary for the implementation team to make sure everything is lined up so that the systems and processes work on day one. Because if the innovation doesn't work, the group advancing it will get a black eye. They are responsible for executing the plan for change. In this study, the SEAs were responsible for the operational administration of K12 computer-based accountability assessments. They focused on preparation of the organization and assessment delivery in the schools. This preparation and delivery extended to the contractors responsible to the SEA for the administration. As these tests moved to computer, the SEA relied more heavily on the contractor to ensure systems stayed up and processes were in place to address likely scenarios.

The three SEA Factors—SEA Procedures and Practices, SEA Capacity Building, and SEA-District Interactions—enable technical implementation. SEA documentation, contractor support and state leadership need to be in place to address the activities of the test administration. Interactions between the SEA and districts enable information sharing through formal and informal mechanisms to support the districts in their work. And, local capacity must be built so that students are able to test efficiently and effectively.

But solving the problems of technical implementation does not automatically lead to a successful adoption of the innovation. In this case, the three SEA Factors were necessary for the technical implementation but insufficient for the adoption of the innovation. As good as the technical implementation was in all three states, it could not prevent students from choosing not to participate.

Student participation matters. The three SEA Factors can enable or hinder participation, but they cannot control it. The SEA can use its procedures and practices to smooth the transition, its interactions to create buy-in and adjust to local considerations, and its ability to build technical and human capacity to support the change. In the end, however, public support matters. Individuals choose to participate in the change and this participation is critical. In this case, the SEA needed to make plans to ensure participation ahead of delivery. This is described in more detail in the *Policy and Practice Implications* section of this chapter.

What didn't prove out from the conceptual framework? The conceptual framework implies a left-to-right cause-and-effect model but it is not that simple. SEA Factors can have both a direct effect on Technical Implementation and an indirect effect on Student Participation. As we saw in the SEA-District State, effects were also bidirectional as was the case with operational scheduling where the state affected participation when they scheduled testing over

the course of 20 days but then the reduction in student participation affected the scheduling. Students didn't just refuse to test; they also asked to be taught. This complicated interaction of factors is not fully represented in my conceptual framework.

Future research

A major area for future research is the exploration of the role of the citizen and others outside of the organizational hierarchy in the adoption of innovations. In this study, the activities at the SEA were affected by the unexpected reaction of stakeholders who dramatically and en masse resisted the change. Collecting data from teachers, students and parents would help in my understanding of the role these local actors played in the adoption of innovations driven by the SEA, especially:

- What could the SEA have done to increase student participation while also allowing a forum for anti-testing protests?

- What could the SEA have done to change public perception of testing, to see it as a necessary element to ensure equal access to education for all?

- Which SEA Factors most contributed to a student's decision to opt out?

Understanding the effect of SEA Factors on both adoption indicators where there are differences in SES characteristics would also be interesting. Research shows high school student participation on accountability assessments is lower in schools with students of higher socioeconomic status (SES) (Bennett, 2016). There may be SES characteristics of districts that affect both technical implementation and student participation. Specifically, the future research would be to apply my model to a different sample, schools with lower SES.

Additionally my model could be applied to other samples – one for urban districts and another for those performing below average on NAEP tests. I could focus on the survey of

district participants in the NAEP Trial Urban District Assessment (TUDA) or district testing directors for states whose NAEP scores fall below average, if their state participated in one of the consortia computer-based assessments. The district survey responses could be compared to the responses of the district testing directors in these three states.

Implications for Policy and Practice

There are implications for policy at both the national and state levels. There are also implications for practice at three levels: state agencies; districts; assessment contractors. Technical implementation is affected by policy and practice at all levels while student participation is largely affected by national and state policy and by practices at the SEA and districts.

Because national and state policymakers most affect the Student Participation indicator for adoption, they should be able to explain the benefits of a particular policy more thoroughly to the public and be more mindful of changes in public opinion. In this study, two states had active anti-testing movements and their policymakers were caught on their heels in defending the usefulness of student test scores. According to the research, not addressing public concerns about testing may have a longer term impact on students:

> Opt out matters because state assessments are the only comparable measures of building-level performance within a state and the only building-level measures disaggregated by demographic group. To the extent that they adequately reflect state standards, these assessments can give education officials information for localized action and advocates a basis for getting resources directed at underperforming, low-SES schools (Bennett, 2016).

In this way, high rates of students refusing to test can affect the conclusions researchers—and policymakers—draw from the final test scores. By not addressing public concerns, student

participation in the SEA-District and SEA-centric states was adversely affected while the SEA had a successful technical implementation.

At the SEA level, the focus can be on technical implementation, but staff should not ignore their role in ensuring student participation. SEAs should develop procedures and practices that include documentation for all stakeholders and enable clearer interactions between the SEA and districts. Better communication throughout the hierarchy and better tools for the district and school administrators to use with teachers, students and parents could have mitigated the problems with the opt-out movement. The SEA should address the concerns of students and the school community head on. This could have reduced the negative effects on student participation.

District staff also affected both indicators of adoption, but in different ways. They are both employees in the organizational hierarchy as well as advocates for their schools and students. Building sufficient capacity needs to include both technical and human capacity for the change. Communicating with stakeholders is certainly one aspect but with technology innovations, stakeholders are looking for utility. Rogers (2003) adoption models describe how the individuals perceive the utility of innovations through the relative advantage of the new over the old, the compatibility with the values and systems in place, the complexity and their ability to understand the change, the trialability and their need to test it out, and the observability and seeing the results of the change. In each community, these characteristics may have different value but all enter into the community's acceptance of the change. Districts need to stay on balance: ensuring community support for change while focusing on the implementation of the change itself.

Lastly, assessment contractors can contribute to the adoption by providing consistent and transparent information to stakeholders and systems that perform as expected. Contractors directly affected the ability of states to technically implement the change because the contractor provided the delivery systems for the tests. These contractors also indirectly affected the student participation by their contributions to the political conversations. If the contractors are under scrutiny by the public, then responding quickly to concerns would be most helpful to easing the political anti-testing environment.

Conclusion

Leading change through research and transparency would decrease the fear, uncertainty and doubt (often abbreviated FUD) of the public. My study introduced a new Conceptual Framework highlighting how Student Participation cannot be taken for granted. This has implications for all stakeholders to address the concerns of the public head on when implementing an innovation in education. Being focused on the technical implementation is necessary but not sufficient for a successful innovation adoption – everyone on the boat must row together.

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Appendix A

Research Questions mapped to Interview protocol

Research Question	SEA Interview question
1: Procedures	What kind of support do you get from your contractor?
	What kind of documentation do you provide to the districts to help them in implementation?
	What outside sources do you look at to help you?
	Who else will help in ensuring implementation goes well? (pilot) How does the state lead?
2: Interactions	What does the state need to do in order to help train? How do you get that information? (pilot)
	Tell me about the communication between the SEA and districts
	Tell me how you communicate within the state for operations and technology for online testing
	What role does the SEA play during the administration window (i.e. involvement in troubleshooting)?
	How are decisions made regarding testing, administration windows, etc.?
	Do the organizations question each other during the development of the process for administration? After testing, is there an open forum for lessons learned?
	Tell me how you communicate with others outside of the SEA and districts
3: Capacity	What do you think the schools will struggle most with for online testing? (pilot)
	How are schools involved in defining their migration path?
	What factors can the districts take a leadership role in addressing? (pilot)
	Describe the organizational structure that supports the testing program. Is there enough support in the SEA for the migration of testing to computers?
	Are there enough people in the SEA that have experience with computers so that they can support districts?
	What kind of knowledge of the online testing program are needed for your team?
	What kind of working knowledge of computers are needed for your team?
	How connected are you to other states or groups for this testing?
	Are you dedicated year-round to the program? What else do you do?

Research Question	SEA Interview question
4: Environment	Has the state mandated a date to start/complete online testing? How was it decided? How is it managed?
	How does the state use the online testing for fed accountability?
	How much practice are students allowed to have prior to the administration? Is this important?
	Do you believe that because students are "digital natives" they are able to test on the computer with ease?
	Are the accessibility advocates in this state influential in the accountability testing procedures? How does that affect the administration locally?
	What are the parents and the press saying about online testing in your state?
	Does the state get devices from local or national foundations? Are there programs for the districts to engage with outside organizations to get equipment?
Dependent Variable	How many schools are doing computer-based testing?

Appendix B

Survey Instruments

State 1

Q24 Title of Study: State Education Agency Contributions to the Adoption of Technology-Enabled Assessments for K12 Statewide Accountability (survey)

Principal Investigator: Diana W. Cano, PhD Student, Rutgers University, Graduate School of Education

Co-principal Investigator: Dr. William Firestone, Professor, Rutgers Graduate School of Education

INTRODUCTION

You are invited to participate in a research study. Before you agree to participate in this study, you should know enough about it to make an informed decision. If you have any questions, ask the investigator. You should be satisfied with the answers before you agree to be in the study.

BACKGROUND/PURPOSE

The purpose of the study is twofold. The first is to understand the district perspective on the adoption of computer-based assessments for statewide accountability testing. The second is to understand the exchange of information on the topic of migrating to computer-based assessments. In this survey, there are two sections – one focused on the capacity issues and one focused on the procedures, practices and interactions between the State Education Agency (SEA) and the district.   Education administrators typically do not have a technology background so may have difficulty in understanding how technology can be used and what human resources, operational processes and technical infrastructure needs to be put in place for it to be used efficiently and effectively. These factors affect the adoption and implementation of technology in K12 accountability assessments. Some states have been delivering both high stakes and formative tests on computers for years but the Race to the Top initiative challenges both novice and expert states to deliver more of their accountability assessments via computer. Many schools have constraints in delivering these technology-enabled assessments for K12 statewide accountability that should be addressed. There is a global need for assessments to measure skills that cannot be measured with paper and a pencil but the practical challenges make the ideal model of simultaneous testing for all students in a statewide accountability test almost impossible. There are contributing factors associated with these challenges that could be addressed by experts once they are known and understood; this study aims to define these factors.

INFORMATION

1. Participation in this study will involve answering questions in an online survey where there will be no more than 30 minutes spent on the survey.

2. All <reference redacted> are being asked to participate in this survey as well as three SEA administrators.

3. The results of this study, if published, can be made available to you.

ALTERNATIVES TO PARTICIPATION

Participation is completely voluntary. This is not a treatment study, and it is not intended that the research project will treat any issues that you may be afflicted with. Your alternative is to not participate.

COST

There is no cost to you for participating in this research project.

RISKS

The subject matter of this survey is fact-based and perception rather than emotion; the risk of any adverse event is low. That said, participating in surveys can be stressful. Risks include the following:

·	Emotional distress

·	Embarrassment or discomfort when answering questions

·	Breach of confidentiality

BENEFITS

Participation in this study may not benefit you directly. However, the knowledge that we obtain from your participation, and the participation of other volunteers, may help us to better understand how information is gathered in order to mitigate the constraining factors of adopting technology for assessments.

CONFIDENTIALITY

This research is confidential. Confidential means that the research records will include some information about you and this information will be stored in such a manner that there is some linkage between your identity and the response in the research exists. Some of the information collected about you includes your email address and the district for which you are responsible. Please note that we will keep this information confidential by limiting individual's access to the research data and keeping it in a secure location. All data will be stored on a password-protected computer's hard drive that has full disk encryption. Original data and consent agreement will be deleted at the conclusion of the study.   The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the

results are presented at a professional conference, only group results will be stated, unless you have agreed otherwise. All study data will be kept for three years.

COMPENSATION

You will receive no compensation for participating in this study.

CONTACT

If you have questions at any time about the research or the procedures, you may contact the principal and co-principal investigators, Diana Cano by phone at 609 734 5995 or email at diana.cano@gse.rutgers.edu, and Dr. William Firestone by email at william.firestone@gse.rutgers.edu or mail at 10 Seminary Place, New Brunswick, NJ 08901. If you have any questions about your rights as a research subject, you may contact the IRB Administrator at:

> Rutgers University Institutional Review Board for the Protection of Human Subjects
>
> Office of Research and Sponsored Programs
>
> 3 Rutgers Plaza
>
> New Brunswick, NJ 08901-8559
>
> Tel: 848 932 0150
>
> Email: humansubjects@orsp.rutgers.edu

PARTICIPATION and WITHDRAWAL

Your participation in this study is voluntary; you may decline to participate at any time without penalty to you. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. You may also refuse to answer any questions that you are not comfortable with. If you withdraw from the study before data collection is completed your data will be removed from the data set and destroyed.

<u>You may print a copy of this form to keep</u>.

Q25 Click below if you agree to participate in this research study.

○ Agree and continue (1)
○ Exit survey (2)
If Exit survey Is Selected, Then Skip To End of Survey

Q2 Generally, does your district use online testing throughout the school year for interim or formative testing?

○ Daily (1)
○ Often (2)
○ Sometimes (3)
○ Rarely (4)

Q3 Generally, do you feel you have enough equipment and support to do online assessments of your students as a normal practice in teaching and learning?

○ Plenty (1)
○ Enough (2)
○ Not enough (3)
○ Barely any (4)

Q5 Generally, who manages IT in the school?

○ District (1)
○ School (2)
○ An outside company (3)

Q6 Generally, how do you engage with outside organizations to get computers, tablets or other mobile computing equipment? (you can check more than one box)

❑ Local school foundations or fundraising efforts (1)
❑ District contracts (2)
❑ National programs (3)
❑ Other sources (please specify if possible) (4) _____

Q7 For the annual accountability assessments, how much technical support for online testing is available for the schools?

○ Plenty (1)
○ Enough (2)
○ Not enough (3)
○ Barely any (4)

Q8 For the annual accountability assessments, does your district have the bandwidth to run the testing?

○ Plenty (all web pages load quickly) (1)
○ Enough (the tests load fine) (2)
○ Not enough (we often need to reload pages or wait for them to display) (3)
○ Almost none (kids need to test in a lot of shifts) (4)

Q9 For the annual accountability assessments, how well prepared are the schools with their equipment?

○ There are enough computers with the right software. (1)
○ Schools could use more up-to-date computers. (2)
○ Schools need more computers. (3)
○ Schools are unprepared. (4)

Q10 For the annual accountability assessments, where do you do testing? (you can check more than one box)

❑ Computer lab (1)
❑ School library (2)
❑ Classroom (3)
❑ Other (please specify if possible) (4) _____

Q11 For the annual accountability assessments, could schools or districts choose when they convert to the computer-based tests? (you can check more than one box)

❑ Schools could choose when to move from paper tests to computer tests. (1)
❑ The district set the date when to move from paper tests to computer tests. (2)
❑ The state told us when to move from paper tests to computer tests. (3)
❑ Other (please specify if possible) (4) _____

Q12 Did the schools invest in new technologies like tablets that are not compatible with the testing software for the annual accountability assessments?

○ Almost all of our new devices are compatible. (1)
○ Most of our new devices are compatible. (2)
○ Some of our new devices won't run the software. (3)
○ We don't have any new technologies. (4)

Q13 For the annual accountability assessments, what % of time does the district tech director spend supporting schools for computer issues?

❍ Less than 25% (1)
❍ 25-50% (2)
❍ 50-75% (3)
❍ More than 75% (4)

Q14 For the annual accountability assessments, how many other district staff members assist with the support during the test administrations?

❍ 0-2 (1)
❍ 3-5 (2)
❍ 6-10 (3)
❍ More than 10 (4)

Q15 Describe the training you received on the online testing procedures for the annual accountability assessments.

Q16 For the annual accountability assessments, how much support does the district get from the contractor for the testing?

❍ Our district or schools talk to the state contractor often. (1)
❍ Sometimes our district gets help from the state contractor. (2)
❍ Our district rarely is in contact with the state contractor. (3)
❍ There is no real contact with the state contractor in my district or its schools. (4)

Q17 For the annual accountability assessments, how useful is the state documentation for preparation and troubleshooting for the assessments?

❍ Often used (1)
❍ Used when we have questions (2)
❍ Used once or twice (3)
❍ Never used (4)

Q18 When did your district first go online for the annual assessments for accountability testing?

Q19 In some states, the State Education Agency (SEA) is seen as a regulator and in others as a source of information. Where would you put your state agency on this scale?

- ○ regulator (1)
- ○ regulatory assistance (2)
- ○ technical / operational assistance (3)
- ○ helpful provider of all information (4)

Q20 How important is the SEA as a source of information for the annual assessments for accountability?

	Not important (1)	Helpful (2)	Important (3)	Critical (4)
Regulatory (1)	○	○	○	○
Technical (2)	○	○	○	○
Operational (3)	○	○	○	○

Q21 How important are other sources of information for the annual assessments for accountability for regulatory, technical or operational issues?

	Not important (1)	Helpful (2)	Important (3)	Critical (4)
National policy information sources (1)	○	○	○	○
State policy information sources (2)	○	○	○	○
State contractor (3)	○	○	○	○
Other district test directors (4)	○	○	○	○
District or school technology coordinators (6)	○	○	○	○
School personnel (7)	○	○	○	○
Parent organizations (8)	○	○	○	○
Internet (please specify) (9)	○	○	○	○
Other (please specify) (10)	○	○	○	○

Q24 Please enter your <district> Name

Q22 I appreciate your help in my research study. Please let me know if you have any other comments in the text box below. Thank you!

States 2 and 3

Q24 INFORMED CONSENT FORM FOR SURVEY

Title of Study: The Role of the State Education Agency (SEA) in Influencing the Statewide Adoption of Computer-Based K12 Accountability Assessments

You are invited to participate in a research study that is being conducted by Diana W. Cano, who is a PhD student in the Graduate School of Education at Rutgers University. The purpose of this study is to define and understand the factors that help or hurt the introduction of computers for annual educational testing. In particular, the testing that happens statewide for the school and district accountability measures will be explored.

- • For the surveys, about 100 subjects from school district administration from two states will participate. The study procedure includes an online survey for each individual where there will be no more than 30 minutes spent on the survey and you can access the questions from anywhere you have access to a computer and the Internet.

This research is confidential. Confidential means that the research records will include some information about you and this information will be stored in such a manner that some linkage between your identity and the response in the research exists. Some of the information collected about you includes your name, title and place of employment. Please note that we will keep this information confidential by limiting individual's access to the research data and keeping it in a secure location. All audio recordings and transcriptions will be stored on a password-protected computer. Original data, signed consent forms, audio files, and interview transcripts will be deleted at the conclusion of the study.

The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated, unless you have agreed otherwise. All study data will be kept for 3 years.   The risks of participation is low given the subject matter of this study and the interview and survey are fact-based rather than emotional. That said, interviews can be stressful. Risks include the following:

- • Emotional distress
- • Embarrassment or discomfort when answering questions
- • Breach of confidentiality

You have been told that the benefits of taking part in this study may be the knowledge that may help us to better understand factors affect the adoption of technology for assessments. However, you may

receive no direct benefit from taking part in this study. You will receive no compensation for participating in this study.

Participation in this study is voluntary. You may choose not to participate, and you may withdraw at any time during the study procedures without any penalty to you. In addition, you may choose not to answer any questions with which you are not comfortable.

If you have questions about the study or the study procedures, you may contact myself at 609 865 3683 or email at diana.cano@gse.rutgers.edu. You may also contact my faculty advisor, Dr. William Firestone by email at william.firestone@gse.rutgers.edu or mail at 10 Seminary Place, New Brunswick, NJ 08901.

If you have any questions about your rights as a research subject, please contact an IRB Administrator at the Rutgers University, Arts and Sciences IRB:

Institutional Review Board

Rutgers University, the State University of New Jersey

Liberty Plaza / Suite 3200

335 George Street, 3rd Floor

New Brunswick, NJ 08901

Phone: 732-235-9806

Email: humansubjects@orsp.rutgers.edu

For surveys, you may print a copy of this form to keep.

Q25 Click below if you agree to participate in this research study.

○ Agree and continue (1)
○ Exit survey (2)
If Exit survey Is Selected, Then Skip To End of Survey

Q2 Generally, does your district use online testing throughout the school year for interim or formative testing?

○ Daily (1)
○ Often (2)
○ Sometimes (3)
○ Rarely (4)

Q3 Generally, do you feel you have enough equipment and support to do online assessments of your students as a normal practice in teaching and learning?

○ Plenty (1)
○ Enough (2)
○ Not enough (3)
○ Barely any (4)

Q5 Generally, who manages IT in the school?

○ District (1)
○ School (2)
○ An outside company (3)

Q6 Generally, how do you engage with outside organizations to get computers, tablets or other mobile computing equipment? (you can check more than one box)

❑ Local school foundations or fundraising efforts (1)
❑ District contracts (2)
❑ National programs (3)
❑ Other sources (please specify if possible) (4) _____

Q7 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), how much technical support for online testing is available for the schools?

○ Plenty (1)
○ Enough (2)
○ Not enough (3)
○ Barely any (4)

Q8 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), does your district have the bandwidth to run the testing?

❍ Plenty (all web pages load quickly) (1)
❍ Enough (the tests load fine) (2)
❍ Not enough (we often need to reload pages or wait for them to display) (3)
❍ Almost none (kids need to test in a lot of shifts) (4)

Q9 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), how well prepared are the schools with their equipment?

❍ There are enough computers with the right software. (1)
❍ Schools could use more up-to-date computers. (2)
❍ Schools need more computers. (3)
❍ Schools are unprepared. (4)

Q10 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), where do you do testing? (you may check more than one box)

❑ Computer lab (1)
❑ School library (2)
❑ Classroom (3)
❑ Other (please specify if possible) (4) _____

Q11 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), could schools or districts choose when they convert to the computer-based tests? (you may check more than one box)

❑ Schools could choose when to move from paper tests to computer tests. (1)
❑ The district set the date when to move from paper tests to computer tests. (2)
❑ The state told us when to move from paper tests to computer tests. (3)
❑ Other (please specify if possible) (4) _____

Q12 Did the schools invest in new technologies like tablets that are not compatible with the testing software for the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced)?

❍ Almost all of our new devices are compatible. (1)
❍ Most of our new devices are compatible. (2)
❍ Some of our new devices won't run the software. (3)
❍ We don't have any new technologies. (4)

Q13 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), what % of time does the district technology director spend supporting schools for computer issues?

○ Less than 25% (1)
○ 25-50% (2)
○ 50-75% (3)
○ More than 75% (4)

Q14 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), how many other district staff members assist with the support during the test administrations?

○ 0-2 (1)
○ 3-5 (2)
○ 6-10 (3)
○ More than 10 (4)

Q15 Describe the training you received on the online testing procedures for the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced).

Q16 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), how much support does the district get from the contractor for the testing?

○ Our division or schools talk to the assessment delivery vendor often. (1)
○ Sometimes our district gets help from the assessment delivery vendor. (2)
○ Our district rarely is in contact with the assessment delivery vendor. (3)
○ There is no real contact with the assessment delivery vendor in my district or its schools. (4)

Q17 For the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced), how helpful is the state documentation for preparation and troubleshooting for the assessments?

○ Often used (1)
○ Used when we have questions (2)
○ Used once or twice (3)
○ We have no documentation. (4)

Q18 When did your district first go online for the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced)?

Q19 In some states, the State Education Agency (SEA) is seen as a regulator and in others as a source of information. Where would you put your state agency on this scale?

- ○ regulator (1)
- ○ regulatory assistance (2)
- ○ technical / operational assistance (3)
- ○ helpful provider of all information (4)

Q20 How important is the SEA as a source of information for the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced)?

	Not important (1)	Helpful (2)	Important (3)	Critical (4)
Regulatory (1)	○	○	○	○
Technical (2)	○	○	○	○
Operational (3)	○	○	○	○

Q21 How important are other sources of information for the annual statewide accountability assessments (e.g. PARCC, Smarter Balanced) for regulatory, technical or operational issues?

	Not important (1)	Helpful (2)	Important (3)	Critical (4)
National policy information sources (1)	○	○	○	○
State policy information sources (2)	○	○	○	○
Assessment delivery vendor (3)	○	○	○	○
Other district testing coordinators (4)	○	○	○	○
District or school technology coordinators (6)	○	○	○	○
School personnel (7)	○	○	○	○
Parent organizations (8)	○	○	○	○
Internet (please specify) (9)	○	○	○	○
Other (please specify) (10)	○	○	○	○

Q24 How would you compare your district's student participation rate this year to the previous statewide accountability assessment?

- ○ Lower this year (1)
- ○ A bit lower this year (2)
- ○ A little higher this year (3)
- ○ Higher this year (4)
- ○ Don't know (5)

Q25 How challenging was it to deal with the following aspects of the administration of the annual statewide accountability assessments this year:

	Relatively Smooth (1) (1)	Periodic challenges arose (2) (2)	Some challenges (3) (3)	Very challenging (4) (4)
Time spent on testing (1)	○	○	○	○
Speed of reporting (2)	○	○	○	○
Utility of test scores (3)	○	○	○	○
Consistency in state agency direction (4)	○	○	○	○
Staff preparedness (5)	○	○	○	○
Parent support (6)	○	○	○	○
Teacher support (7)	○	○	○	○
Student support (8)	○	○	○	○
Information provided (9)	○	○	○	○

Q26 Comments on the above (optional):

Q24 Please enter your District Name

Q22 I appreciate your help in my research study. Please let me know if you have any other comments in the text box below. Thank you!

Appendix C

Coding for Interviews

1. National policy factors

    1.1. Federal accountability

2. State policy factors

    2.1. State funding

    2.2. State directive for online

    2.3. State HS Exit Exams

3. School capacity

    3.1. Teacher tech support

    3.2. School IT Infrastructure

    3.3. School computers age or quantity

    3.4. School operational scheduling

    3.5. School migration path

    3.6. School has new incompatible devices

    3.7. School manages and maintains IT

4. State organizational structure and dynamics

    4.1. State trains districts

        4.1.1. Communication state-district

        4.1.2. Communication tech-ops

    4.2. State contractor support

    4.3. State documentation

    4.4. State independent research

    4.5. State leadership

5. Test Design

    5.1. Practice

    5.2. Digital natives

6. Accommodations

    6.1. Accessibility

7. Parents and public

Appendix D

Data from NCES

	Race - Total	Race - White Alone	white of total population	Total Students	Total Students-White	Free Lunch Eligible	Reduced-price Lunch Eligible	LEP/ELL Students	Individualized Education Program
Massachusetts	6,349,095	5,365,140	84.5%	954,773	630,150	305,767	47,221	67,438	166,437
New Jersey	8,414,350	6,099,440	72.5%	1,372,203	683,857	424,157	77,647	58,349	223,423
Ohio	11,353,140	9,640,525	84.9%	1,729,916	1,267,331	578,140	96,298	39,870	255,953
Arkansas	2,673,400	2,137,165	79.9%	486,157	310,458	251,900	46,673	33,889	64,619
Colorado	4,301,260	3,558,580	82.7%	863,561	480,366	297,142	61,734	103,942	89,280
Illinois	12,419,295	9,123,565	73.5%	2,072,880	1,046,882	918,726	111,330	191,742	289,904
Maryland	5,296,485	3,391,020	64.0%	859,638	359,110	313,679	53,016	55,343	102,583
Mississippi	2,844,660	1,745,355	61.4%	493,650	225,715	313,998	38,086	8,485	64,622
New Mexico	1,819,045	1,214,680	66.8%	338,220	86,359	208,699	20,550	52,593	46,495
Idaho	1,293,955	1,176,570	90.9%	284,834	221,283	108,263	26,297	16,726	27,086
Washington	5,894,120	4,815,070	81.7%	1,051,694	622,485	402,212	72,728	93,940	130,778
Oregon	3,421,400	2,957,510	86.4%	587,564	378,737	247,736	38,899	50,371	81,494
Connecticut	3,405,565	2,777,795	81.6%	550,954	328,144	172,813	28,272	30,958	69,715
Maine	1,274,925	1,236,420	97.0%	185,739	169,722	68,770	11,866	4,980	29,517
New Hampshire	1,235,785	1,186,450	96.0%	188,974	167,342	41,203	9,393	3,714	29,204
South Dakota	754,845	669,475	88.7%	130,471	101,242	41,367	10,311	5,004	18,316
Vermont	608,825	588,835	96.7%	89,624	82,401	27,680	4,901	1,427	13,873
West Virginia	1,808,345	1,717,480	95.0%	283,044	258,780	133,467	15,026	2,084	44,461
U.S. (average)	5,518,076	4,144,190	75.1%	975,904	497,389	426,921	67,015	85,177	125,453

	Pupil/ Teacher Ratio	white of total student population	%diff btw total and student whiteness	full price lunch of total student population	free lunch of total student population	ELL of total	IEP of total
Massachusetts	13.52	66.0%	18.5%	63.0%	32.0%	7.1%	17.4%
New Jersey	12.37	49.8%	22.7%	63.4%	30.9%	4.3%	16.3%
Ohio	16.32	73.3%	11.7%	61.0%	33.4%	2.3%	14.8%
Arkansas	14.24	63.9%	16.1%	38.6%	51.8%	7.0%	13.3%
Colorado	17.65	55.6%	27.1%	58.4%	34.4%	12.0%	10.3%
Illinois	15.28	50.5%	23.0%	50.3%	44.3%	9.3%	14.0%
Maryland	14.89	41.8%	22.2%	57.3%	36.5%	6.4%	11.9%
Mississippi	15.14	45.7%	15.6%	28.7%	63.6%	1.7%	13.1%
New Mexico	15.23	25.5%	41.2%	32.2%	61.7%	15.5%	13.7%
Idaho	19.56	77.7%	13.2%	52.8%	38.0%	5.9%	9.5%
Washington	19.59	59.2%	22.5%	54.8%	38.2%	8.9%	12.4%
Oregon	22.25	64.5%	22.0%	51.2%	42.2%	8.6%	13.9%
Connecticut	12.54	59.6%	22.0%	63.5%	31.4%	5.6%	12.7%
Maine	12.2	91.4%	5.6%	56.6%	37.0%	2.7%	15.9%
New Hampshire	12.66	88.6%	7.5%	73.2%	21.8%	2.0%	15.5%
South Dakota	13.98	77.6%	11.1%	60.4%	31.7%	3.8%	14.0%
Vermont	10.67	91.9%	4.8%	63.6%	30.9%	1.6%	15.5%
West Virginia	14.08	91.4%	3.5%	47.5%	47.2%	0.7%	15.7%
U.S. (average)	16.01	51.0%	24.1%	49.4%	43.7%	8.7%	12.9%

	Federal Revenues	Total Revenues	Total Expenditures for Education	$ per student	% of revenue from feds
Massachusetts	$1,271,995,242	$15,357,042,437	$14,715,706,038	$15,412.78	8.3%
New Jersey	$1,336,981,758	$25,217,564,132	$25,308,864,963	$18,443.97	5.3%
Ohio	$2,702,863,442	$22,973,367,887	$23,500,247,229	$13,584.62	11.8%
Arkansas	$859,309,175	$5,273,728,069	$5,392,058,328	$11,091.19	16.3%
Colorado	$991,623,452	$8,820,782,705	$8,743,142,402	$10,124.52	11.2%
Illinois	$2,900,110,307	$28,895,632,792	$27,621,032,784	$13,324.96	10.0%
Maryland	$1,256,209,654	$13,437,322,051	$13,251,724,515	$15,415.47	9.3%
Mississippi	$1,006,453,225	$4,483,191,303	$4,268,801,070	$8,647.42	22.4%
New Mexico	$721,936,398	$3,744,075,520	$3,641,734,993	$10,767.36	19.3%
Idaho	$305,825,873	$2,183,491,469	$2,107,272,136	$7,398.25	14.0%
Washington	$1,365,967,681	$11,801,402,328	$12,025,482,806	$11,434.39	11.6%
Oregon	$864,118,296	$6,120,056,054	$6,201,701,802	$10,554.94	14.1%
Connecticut	$827,617,663	$9,989,985,838	$9,944,120,595	$18,048.91	8.3%
Maine	$289,248,684	$2,597,927,115	$2,630,547,710	$14,162.60	11.1%
New Hampshire	$205,572,141	$2,844,768,504	$2,896,806,994	$15,329.13	7.2%
South Dakota	$265,922,004	$1,307,520,113	$1,347,213,444	$10,325.77	20.3%
Vermont	$175,720,581	$1,641,954,854	$1,515,637,865	$16,911.07	10.7%
West Virginia	$513,738,807	$3,499,055,402	$3,515,624,340	$12,420.77	14.7%
U.S. (average)	$1,481,205,394	$11,848,886,444	$11,847,351,216	$12,139.87	12.5%

Appendix E

Statistical Output for Tables 4.10, 4.11 and 4.13

Table 4.10 ANOVA Output

NEW FILE.

DATASET NAME DataSet1 WINDOW=FRONT.

ONEWAY Q11 Q13 Q16 BY State

 /MISSING ANALYSIS

 /POSTHOC=TUKEY SCHEFFE BONFERRONI ALPHA(0.05).

Oneway

Notes

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	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY Q11 Q13 Q16 BY State
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		/POSTHOC=TUKEY SCHEFFE BONFERRONI ALPHA(0.05).
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[DataSet1]

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q11	Between Groups	8.253	2	4.127	23.932	.000
	Within Groups	39.314	228	.172		
	Total	47.567	230			
Q13	Between Groups	3.325	2	1.662	8.370	.000
	Within Groups	44.885	226	.199		
	Total	48.210	228			
Q16	Between Groups	.858	2	.429	4.682	.010
	Within Groups	20.616	225	.092		
	Total	21.474	227			

Post Hoc Tests

Multiple Comparisons

Dependent Variable		(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Q11	Tukey HSD	1.00	2.00	.31266*	.07927	.000	.1256	.4997
			3.00	-.12412	.07226	.201	-.2946	.0464
		2.00	1.00	-.31266*	.07927	.000	-.4997	-.1256
			3.00	-.43678*	.06332	.000	-.5862	-.2874
		3.00	1.00	.12412	.07226	.201	-.0464	.2946
			2.00	.43678*	.06332	.000	.2874	.5862
	Scheffe	1.00	2.00	.31266*	.07927	.001	.1173	.5080
			3.00	-.12412	.07226	.231	-.3022	.0539
		2.00	1.00	-.31266*	.07927	.001	-.5080	-.1173
			3.00	-.43678*	.06332	.000	-.5928	-.2808
		3.00	1.00	.12412	.07226	.231	-.0539	.3022
			2.00	.43678*	.06332	.000	.2808	.5928
	Bonferroni	1.00	2.00	.31266*	.07927	.000	.1215	.5038
			3.00	-.12412	.07226	.262	-.2984	.0502
		2.00	1.00	-.31266*	.07927	.000	-.5038	-.1215
			3.00	-.43678*	.06332	.000	-.5895	-.2841
		3.00	1.00	.12412	.07226	.262	-.0502	.2984
			2.00	.43678*	.06332	.000	.2841	.5895
Q13	Tukey HSD	1.00	2.00	.23018*	.08508	.020	.0295	.4309

				Mean Difference	Std. Error	Sig.	Lower Bound	Upper Bound
			3.00	-.04348	.07775	.842	-.2269	.1399
		2.00	1.00	-.23018*	.08508	.020	-.4309	-.0295
			3.00	-.27366*	.06817	.000	-.4345	-.1128
		3.00	1.00	.04348	.07775	.842	-.1399	.2269
			2.00	.27366*	.06817	.000	.1128	.4345
	Scheffe	1.00	2.00	.23018*	.08508	.027	.0205	.4398
			3.00	-.04348	.07775	.855	-.2351	.1481
		2.00	1.00	-.23018*	.08508	.027	-.4398	-.0205
			3.00	-.27366*	.06817	.000	-.4416	-.1057
		3.00	1.00	.04348	.07775	.855	-.1481	.2351
			2.00	.27366*	.06817	.000	.1057	.4416
	Bonferroni	1.00	2.00	.23018*	.08508	.022	.0250	.4354
			3.00	-.04348	.07775	1.000	-.2310	.1440
		2.00	1.00	-.23018*	.08508	.022	-.4354	-.0250
			3.00	-.27366*	.06817	.000	-.4381	-.1092
		3.00	1.00	.04348	.07775	1.000	-.1440	.2310
			2.00	.27366*	.06817	.000	.1092	.4381
Q16	Tukey HSD	1.00	2.00	-.16944*	.05779	.010	-.3058	-.0331
			3.00	-.06598	.05287	.426	-.1907	.0588
		2.00	1.00	.16944*	.05779	.010	.0331	.3058
			3.00	.10346	.04638	.068	-.0060	.2129
		3.00	1.00	.06598	.05287	.426	-.0588	.1907
			2.00	-.10346	.04638	.068	-.2129	.0060

Scheffe	1.00	2.00	-.16944[*]	.05779	.015	-.3118	-.0270
		3.00	-.06598	.05287	.460	-.1963	.0643
	2.00	1.00	.16944[*]	.05779	.015	.0270	.3118
		3.00	.10346	.04638	.085	-.0108	.2177
	3.00	1.00	.06598	.05287	.460	-.0643	.1963
		2.00	-.10346	.04638	.085	-.2177	.0108
Bonferroni	1.00	2.00	-.16944[*]	.05779	.011	-.3088	-.0301
		3.00	-.06598	.05287	.640	-.1935	.0616
	2.00	1.00	.16944[*]	.05779	.011	.0301	.3088
		3.00	.10346	.04638	.080	-.0084	.2153
	3.00	1.00	.06598	.05287	.640	-.0616	.1935
		2.00	-.10346	.04638	.080	-.2153	.0084

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

Q11

	State	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	2.00	68	.4265	
	1.00	46		.7391
	3.00	117		.8632
	Sig.		1.000	.198
Scheffe[a,b]	2.00	68	.4265	

			Subset for alpha = 0.05
			1
1.00	46		.7391
3.00	117		.8632
Sig.		1.000	.228

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 66.678.

b. The group sizes are unequal. The harmonic mean of the group
sizes is used. Type I error levels are not guaranteed.

Q13

	State	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	2.00	68	.1176	
	1.00	46		.3478
	3.00	115		.3913
	Sig.		1.000	.840
Scheffe[a,b]	2.00	68	.1176	
	1.00	46		.3478
	3.00	115		.3913
	Sig.		1.000	.854

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 66.459.

b. The group sizes are unequal. The harmonic mean of the group
sizes is used. Type I error levels are not guaranteed.

Q16

| | State | N | Subset for alpha = 0.05 | |
			1	2
Tukey HSD[a,b]	1.00	46	.0217	
	3.00	114	.0877	.0877
	2.00	68		.1912
	Sig.		.422	.122
Scheffe[a,b]	1.00	46	.0217	
	3.00	114	.0877	.0877
	2.00	68		.1912
	Sig.		.456	.146

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 66.347.

b. The group sizes are unequal. The harmonic mean of the group
sizes is used. Type I error levels are not guaranteed.

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  'meeting\Cano_dissertation_Table_4-10.sav'

 /COMPRESSED.

Table 4.11 ANOVA Output

GET

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  /MISSING ANALYSIS

  /POSTHOC=TUKEY SCHEFFE BONFERRONI ALPHA(0.05).

Oneway

Notes

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	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
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ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q2	Between Groups	4.867	2	2.433	10.696	.000
	Within Groups	53.235	234	.227		
	Total	58.101	236			
Q20_Reg	Between Groups	4.001	2	2.000	8.648	.000
	Within Groups	50.425	218	.231		
	Total	54.425	220			
Q20_Tech	Between Groups	2.225	2	1.113	7.322	.001
	Within Groups	32.975	217	.152		
	Total	35.200	219			
Q20_Ops	Between Groups	3.122	2	1.561	8.635	.000

	Within Groups	39.043	216	.181		
	Total	42.164	218			
Q21_vendor	Between Groups	3.568	2	1.784	7.693	.001
	Within Groups	50.085	216	.232		
	Total	53.653	218			

Post Hoc Tests

Multiple Comparisons

Dependent Variable		(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Q2	Tukey HSD	1.00	2.00	.29588*	.08886	.003	.0863	.5055
			3.00	.36941*	.08038	.000	.1798	.5590
		2.00	1.00	-.29588*	.08886	.003	-.5055	-.0863
			3.00	.07353	.07251	.569	-.0975	.2446
		3.00	1.00	-.36941*	.08038	.000	-.5590	-.1798
			2.00	-.07353	.07251	.569	-.2446	.0975
	Scheffe	1.00	2.00	.29588*	.08886	.004	.0770	.5148
			3.00	.36941*	.08038	.000	.1714	.5674
		2.00	1.00	-.29588*	.08886	.004	-.5148	-.0770
			3.00	.07353	.07251	.599	-.1051	.2522
		3.00	1.00	-.36941*	.08038	.000	-.5674	-.1714
			2.00	-.07353	.07251	.599	-.2522	.1051
	Bonferroni	1.00	2.00	.29588*	.08886	.003	.0816	.5101

			3.00	.36941*	.08038	.000	.1756	.5632
		2.00	1.00	-.29588*	.08886	.003	-.5101	-.0816
			3.00	.07353	.07251	.935	-.1013	.2484
		3.00	1.00	-.36941*	.08038	.000	-.5632	-.1756
			2.00	-.07353	.07251	.935	-.2484	.1013
Q20_Reg	Tukey HSD	1.00	2.00	.38424*	.09398	.000	.1625	.6060
			3.00	.28326*	.08639	.003	.0794	.4871
		2.00	1.00	-.38424*	.09398	.000	-.6060	-.1625
			3.00	-.10098	.07441	.365	-.2766	.0746
		3.00	1.00	-.28326*	.08639	.003	-.4871	-.0794
			2.00	.10098	.07441	.365	-.0746	.2766
	Scheffe	1.00	2.00	.38424*	.09398	.000	.1526	.6159
			3.00	.28326*	.08639	.005	.0703	.4962
		2.00	1.00	-.38424*	.09398	.000	-.6159	-.1526
			3.00	-.10098	.07441	.400	-.2844	.0824
		3.00	1.00	-.28326*	.08639	.005	-.4962	-.0703
			2.00	.10098	.07441	.400	-.0824	.2844
	Bonferroni	1.00	2.00	.38424*	.09398	.000	.1575	.6110
			3.00	.28326*	.08639	.004	.0748	.4917
		2.00	1.00	-.38424*	.09398	.000	-.6110	-.1575
			3.00	-.10098	.07441	.528	-.2805	.0785
		3.00	1.00	-.28326*	.08639	.004	-.4917	-.0748
			2.00	.10098	.07441	.528	-.0785	.2805

Q20_Tech	Tukey HSD	1.00	2.00	.20132*	.07617	.024	.0216	.3811
			3.00	.26808*	.07011	.001	.1026	.4335
		2.00	1.00	-.20132*	.07617	.024	-.3811	-.0216
			3.00	.06676	.06041	.512	-.0758	.2093
		3.00	1.00	-.26808*	.07011	.001	-.4335	-.1026
			2.00	-.06676	.06041	.512	-.2093	.0758
	Scheffe	1.00	2.00	.20132*	.07617	.032	.0136	.3891
			3.00	.26808*	.07011	.001	.0953	.4409
		2.00	1.00	-.20132*	.07617	.032	-.3891	-.0136
			3.00	.06676	.06041	.544	-.0821	.2157
		3.00	1.00	-.26808*	.07011	.001	-.4409	-.0953
			2.00	-.06676	.06041	.544	-.2157	.0821
	Bonferroni	1.00	2.00	.20132*	.07617	.026	.0175	.3851
			3.00	.26808*	.07011	.001	.0989	.4372
		2.00	1.00	-.20132*	.07617	.026	-.3851	-.0175
			3.00	.06676	.06041	.811	-.0790	.2125
		3.00	1.00	-.26808*	.07011	.001	-.4372	-.0989
			2.00	-.06676	.06041	.811	-.2125	.0790
Q20_Ops	Tukey HSD	1.00	2.00	.26119*	.08367	.006	.0637	.4587
			3.00	.31818*	.07712	.000	.1362	.5002
		2.00	1.00	-.26119*	.08367	.006	-.4587	-.0637
			3.00	.05699	.06589	.663	-.0985	.2125
		3.00	1.00	-.31818*	.07712	.000	-.5002	-.1362
			2.00	-.05699	.06589	.663	-.2125	.0985

	Scheffe	1.00	2.00	.26119*	.08367	.009	.0550	.4674
			3.00	.31818*	.07712	.000	.1281	.5083
		2.00	1.00	-.26119*	.08367	.009	-.4674	-.0550
			3.00	.05699	.06589	.688	-.1054	.2194
		3.00	1.00	-.31818*	.07712	.000	-.5083	-.1281
			2.00	-.05699	.06589	.688	-.2194	.1054
	Bonferroni	1.00	2.00	.26119*	.08367	.006	.0593	.4631
			3.00	.31818*	.07712	.000	.1321	.5042
		2.00	1.00	-.26119*	.08367	.006	-.4631	-.0593
			3.00	.05699	.06589	1.000	-.1020	.2160
		3.00	1.00	-.31818*	.07712	.000	-.5042	-.1321
			2.00	-.05699	.06589	1.000	-.2160	.1020
Q21_vendor	Tukey HSD	1.00	2.00	.33853*	.09344	.001	.1180	.5590
			3.00	.30219*	.08612	.002	.0989	.5054
		2.00	1.00	-.33853*	.09344	.001	-.5590	-.1180
			3.00	-.03635	.07489	.878	-.2131	.1404
		3.00	1.00	-.30219*	.08612	.002	-.5054	-.0989
			2.00	.03635	.07489	.878	-.1404	.2131
	Scheffe	1.00	2.00	.33853*	.09344	.002	.1082	.5688
			3.00	.30219*	.08612	.003	.0899	.5145
		2.00	1.00	-.33853*	.09344	.002	-.5688	-.1082
			3.00	-.03635	.07489	.889	-.2209	.1482
		3.00	1.00	-.30219*	.08612	.003	-.5145	-.0899

		2.00	.03635	.07489	.889	-.1482	.2209
Bonferroni	1.00	2.00	.33853*	.09344	.001	.1131	.5640
		3.00	.30219*	.08612	.002	.0944	.5100
	2.00	1.00	-.33853*	.09344	.001	-.5640	-.1131
		3.00	-.03635	.07489	1.000	-.2170	.1443
	3.00	1.00	-.30219*	.08612	.002	-.5100	-.0944
		2.00	.03635	.07489	1.000	-.1443	.2170

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

Q2

	State	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	3.00	119	.4706	
	2.00	68	.5441	
	1.00	50		.8400
	Sig.		.635	1.000
Scheffe[a,b]	3.00	119	.4706	
	2.00	68	.5441	
	1.00	50		.8400
	Sig.		.662	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 69.591.

b. The group sizes are unequal. The harmonic mean of the group
sizes is used. Type I error levels are not guaranteed.

Q20_Reg

	State	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	2.00	67	.3134	
	3.00	111	.4144	
	1.00	43		.6977
	Sig.		.464	1.000
Scheffe[a,b]	2.00	67	.3134	
	3.00	111	.4144	
	1.00	43		.6977
	Sig.		.497	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 63.573.

b. The group sizes are unequal. The harmonic mean of the group
sizes is used. Type I error levels are not guaranteed.

Q20_Tech

	State	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	3.00	110	.1273	
	2.00	67	.1940	
	1.00	43		.3953
	Sig.		.600	1.000
Scheffe[a,b]	3.00	110	.1273	
	2.00	67	.1940	
	1.00	43		.3953
	Sig.		.629	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 63.462.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Q20_Ops

	State	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	3.00	110	.1818	
	2.00	67	.2388	
	1.00	42		.5000
	Sig.		.734	1.000
Scheffe[a,b]	3.00	110	.1818	

2.00	67	.2388	
1.00	42		.5000
Sig.		.755	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 62.728.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Q21_vendor

	State	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	2.00	67	.3433	
	3.00	108	.3796	
	1.00	44		.6818
	Sig.		.905	1.000
Scheffe[a,b]	2.00	67	.3433	
	3.00	108	.3796	
	1.00	44		.6818
	Sig.		.913	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 63.950.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 4.13 ANOVA Output

ONEWAY Q3 Q8 Q9_have_enough_computers Q9_need_more_up_to_date Q9_need_more_computers

  Q9_schools_unprepared BY State

 /MISSING ANALYSIS

 /POSTHOC=TUKEY SCHEFFE BONFERRONI ALPHA(0.05).

Oneway

Notes

Output Created		23-MAR-2017 10:52:01
Comments		
Input	Data	C:\Users\dcano\OneDrive - Educational Testing Service\Documents\Info Storage\Rutgers\Data analysis for PhD\ANOVA after committee meeting\Cano_dissertation_Table 4-13a.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
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	N of Rows in Working Data File	237
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.

	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY Q3 Q8 Q9_have_enough_computers Q9_need_more_up_to_date Q9_need_more_computers
		Q9_schools_unprepared BY State
		/MISSING ANALYSIS
		/POSTHOC=TUKEY SCHEFFE BONFERRONI ALPHA(0.05).
Resources	Processor Time	00:00:00.06
	Elapsed Time	00:00:00.11

ANOVA

		Sum of Squares	df	Mean Square	F	
Q3	Between Groups	.216	2	.108	.519	
	Within Groups	48.696	234	.208		
	Total	48.911	236			
Q8	Between Groups	.321	2	.160	2.873	
	Within Groups	12.838	230	.056		
	Total	13.159	232			
Q9_have_enough_compu ters	Between Groups	1.295	2	.647	2.621	
	Within Groups	56.825	230	.247		
	Total	58.120	232			

Q9_need_more_up_to_date	Between Groups	.205	2	.102	.550	
	Within Groups	42.851	230	.186		
	Total	43.056	232			
Q9_need_more_computers	Between Groups	.907	2	.453	2.604	
	Within Groups	40.038	230	.174		
	Total	40.944	232			
Q9_schools_unprepared	Between Groups	.010	2	.005	1.215	
	Within Groups	.985	230	.004		
	Total	.996	232			

ANOVA

		Sig.
Q3	Between Groups	.596
	Within Groups	
	Total	
Q8	Between Groups	.059
	Within Groups	
	Total	
Q9_have_enough_computers	Between Groups	.075
	Within Groups	
	Total	
Q9_need_more_up_to_date	Between Groups	.578
	Within Groups	

	Total	
Q9_need_more_computers	Between Groups	.076
	Within Groups	
	Total	
Q9_schools_unprepared	Between Groups	.298
	Within Groups	
	Total	

Homogeneous Subsets

Q3

	State	N	Subset for alpha = 0.05
			1
Tukey HSD[a,b]	2.00	68	.6618
	1.00	50	.7200
	3.00	119	.7311
	Sig.		.643
Scheffe[a,b]	2.00	68	.6618
	1.00	50	.7200
	3.00	119	.7311
	Sig.		.670

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 69.591.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Q8

	State	N	Subset for alpha = 0.05
			1
Tukey HSD[a,b]	2.00	68	.8824
	1.00	47	.9574
	3.00	118	.9661
	Sig.		.101
Scheffe[a,b]	2.00	68	.8824
	1.00	47	.9574
	3.00	118	.9661
	Sig.		.122

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 67.481.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Q9_have_enough_computers

	State	N	Subset for alpha = 0.05
			1
Tukey HSD[a,b]	2.00	68	.4118

			Subset for alpha = 0.05
			1
	1.00	47	.5319
	3.00	118	.5847
	Sig.		.109
Scheffe[a,b]	2.00	68	.4118
	1.00	47	.5319
	3.00	118	.5847
	Sig.		.132

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 67.481.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Q9_need_more_up_to_date

	State	N	Subset for alpha = 0.05
			1
Tukey HSD[a,b]	3.00	118	.2203
	2.00	68	.2500
	1.00	47	.2979
	Sig.		.550
Scheffe[a,b]	3.00	118	.2203
	2.00	68	.2500
	1.00	47	.2979

			.581

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 67.481.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Q9_need_more_computers

	State	N	Subset for alpha = 0.05
			1
Tukey HSD[a,b]	1.00	47	.1702
	3.00	118	.1949
	2.00	68	.3235
	Sig.		.085
Scheffe[a,b]	1.00	47	.1702
	3.00	118	.1949
	2.00	68	.3235
	Sig.		.105

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 67.481.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Q9_schools_unprepared

	State	N	Subset for alpha = 0.05
			1
Tukey HSD[a,b]	1.00	47	.0000
	3.00	118	.0000
	2.00	68	.0147
	Sig.		.394
Scheffe[a,b]	1.00	47	.0000
	3.00	118	.0000
	2.00	68	.0147
	Sig.		.428

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 67.481.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

GET

 FILE='C:\Users\dcano\OneDrive - Educational Testing Service\Documents\Info Storage\Rutgers\Data analysis for PhD\ANOVA after committee meeting\Cano_dissertation_Table 4-13a.sav'.

DATASET NAME DataSet1 WINDOW=FRONT.

ONEWAY Q7 BY State

/MISSING ANALYSIS

/POSTHOC=TUKEY SCHEFFE BONFERRONI ALPHA(0.05).

Oneway

Notes

Output Created		23-MAR-2017 10:43:19
Comments		
Input	Data	C:\Users\dcano\OneDrive - Educational Testing Service\Documents\Info Storage\Rutgers\Data analysis for PhD\ANOVA after committee meeting\Cano_dissertation_Table 4-13a.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	237
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY Q7 BY State
		/MISSING ANALYSIS
		/POSTHOC=TUKEY SCHEFFE BONFERRONI ALPHA(0.05).

Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03

[DataSet1] C:\Users\dcano\OneDrive - Educational Testing Service\Documents\Info Storage\Rutgers\Data analysis for PhD\ANOVA after committee meeting\Cano_dissertation_Table 4-13a.sav

ANOVA

Q7

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.006	2	.503	3.756	.025
Within Groups	30.797	230	.134		
Total	31.803	232			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Q7

	(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	
Tukey HSD	1.00	2.00	.15832	.06941	.061	-.0054	
		3.00	.02074	.06312	.942	-.1282	
	2.00	1.00	-.15832	.06941	.061	-.3221	

		3.00	-.13759*	.05571	.038	-.2690	
	3.00	1.00	-.02074	.06312	.942	-.1696	
		2.00	.13759*	.05571	.038	.0062	
Scheffe	1.00	2.00	.15832	.06941	.076	-.0127	
		3.00	.02074	.06312	.947	-.1348	
	2.00	1.00	-.15832	.06941	.076	-.3293	
		3.00	-.13759*	.05571	.049	-.2748	
	3.00	1.00	-.02074	.06312	.947	-.1762	
		2.00	.13759*	.05571	.049	.0003	
Bonferroni	1.00	2.00	.15832	.06941	.070	-.0091	
		3.00	.02074	.06312	1.000	-.1315	
	2.00	1.00	-.15832	.06941	.070	-.3257	
		3.00	-.13759*	.05571	.043	-.2719	
	3.00	1.00	-.02074	.06312	1.000	-.1729	
		2.00	.13759*	.05571	.043	.0032	

Multiple Comparisons

Dependent Variable: Q7

			95% Confidence Interval
	(I) State	(J) State	Upper Bound
Tukey HSD	1.00	2.00	.3221
		3.00	.1696

	2.00	1.00	.0054
		3.00	-.0062
	3.00	1.00	.1282
		2.00	.2690
Scheffe	1.00	2.00	.3293
		3.00	.1762
	2.00	1.00	.0127
		3.00	-.0003
	3.00	1.00	.1348
		2.00	.2748
Bonferroni	1.00	2.00	.3257
		3.00	.1729
	2.00	1.00	.0091
		3.00	-.0032
	3.00	1.00	.1315
		2.00	.2719

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

Q7

		Subset for alpha = 0.05	
State	N	1	2

Tukey HSD[a,b]	2.00	68	.7353	
	3.00	118	.8729	.8729
	1.00	47		.8936
	Sig.		.076	.942
Scheffe[a,b]	2.00	68	.7353	
	3.00	118	.8729	.8729
	1.00	47		.8936
	Sig.		.094	.947

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 67.481.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

MEANS TABLES=Q7 BY State

 /CELLS=MEAN COUNT STDDEV.

Means

Notes

Output Created		23-MAR-2017 10:47:16
Comments		
Input	Data	C:\Users\dcano\OneDrive - Educational Testing Service\Documents\Info Storage\Rutgers\Data analysis for PhD\ANOVA after committee meeting\Cano_dissertation_Table 4-13a.sav

	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	237
Missing Value Handling	Definition of Missing	For each dependent variable in a table, user-defined missing values for the dependent and all grouping variables are treated as missing.
	Cases Used	Cases used for each table have no missing values in any independent variable, and not all dependent variables have missing values.
Syntax		MEANS TABLES=Q7 BY State /CELLS=MEAN COUNT STDDEV.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.03

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Q7 * State	233	98.3%	4	1.7%	237	100.0%

Report

Q7

State	Mean	N	Std. Deviation
1.00	.8936	47	.31166
2.00	.7353	68	.44446
3.00	.8729	118	.33453
Total	.8369	233	.37024