Network Designs for Instructional Reform:
Building Systems for Large-Scale School Improvement

By

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Educational Studies)
in The University of Michigan
2019

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DEDICATION

To Kevin, Mallory, and James, for their sacrifice. This truly was a collective effort.

To my parents, for their unending support.

ACKNOWLEDGMENTS

This project would not have been possible without the support of many individuals and organizations who helped me along the way. I would like to take a moment to thank and acknowledge those who played a special role in helping me to achieve my goals.

To my advisor, Don Peurach, who mentored me as a young M.A. student and encouraged me to pursue my PhD. You have pushed me to see the world more analytically, and taught me to ask critical questions about things that truly matter. You helped apprentice me into the world of academia, of which I knew nothing about, and did so as a friend and colleague. Most of all, you allowed me to prioritize family and loved ones throughout the process. I could not be more appreciative for all you have done.

To those at the University of Michigan, thank you for your ongoing support throughout my program. To my fellow graduate students, Jared Aumen, Sylvie Kademian, Kiel McQueen, and Nick Orlowski, whose friendship made this journey all the more enjoyable. In particular, to Blair Beuche, whose friendship I've leaned on during our lockstep march to the end. To Professor Bob Bain, who provided me the opportunity to remain deeply connected to the classroom and who helped me grow as an educator and scholar. To the School of Education and Rackham Graduate School, thank you for the financial and other support throughout the program, without which this would never have been possible.

To my dissertation committee members, Don Peurach, Priscilla Wohlstetter, Bob Bain, and Barry Fishman, who pushed my thinking in important ways. Your feedback and guidance

throughout this process helped this project to evolve into something of which I am truly proud. Thank you for your time, patience, and mentorship.

To the members of the Spencer research team, Priscilla Wohlstetter, Diane Massell, Megan Duff, and Clare Flack, whose collaboration contributed greatly to many of the ideas presented in this study. You have all helped to move this work forward in important ways, and I thank you for being my thought partners. To the Spencer Foundation, thank you for supporting us in this work.

To the participants in this study, thank you for opening up your practice and for the candor with which you shared your experiences. Your willingness to share your work is a testament to your commitment to improving schools.

To my parents, John and Pat Gargaro, who laid the foundation for me to achieve this endeavor. You instilled in me the hard work, resilience, and drive I needed to get past the finish line. I carry the lessons you have taught me into everything I do, and can only hope to recreate the same lessons for my own family. To my siblings, John, Kyle, and Kerry, my in-laws, Bob and Joyce, and Aunt Mary Ann, thank you for all your support, encouragement, and child care that helped me get to the end.

Finally, to my husband, Kevin, and children, Mallory and James. To Kevin, you have supported me in countless ways so I could pursue this dream. You have been by my side since the beginning. This milestone is a product of our partnership and love. To Mallory and James, you are by far the most important things to have come out of this journey. You will always be the center of it all. Let this be a reminder that you can accomplish anything.

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ABSTRACT

Increasingly, educational networks are regarded as unique organizational arrangements capable of supporting large-scale instructional improvement. While a portion of the existing research on educational networks takes on matters of efficacy to improve outcomes, there is more limited research focused on understanding the core work of running educational networks. As activity around educational networks proliferates to include many types of networks existing in and around schools, there is a need to establish analytic frameworks that help researchers to 1) understand and reason about the core work of educational networks and 2) compare across different network types.

This study moves on this agenda by 1) developing an analytic framework for understanding educational networks and 2) empirically testing that framework using a cross-case analysis of two networks positioned in different market sectors. This study finds fundamental distinctions in the networks' designs for instructional improvement: one leveraging a highly-specified, fidelity-based approach; the other leveraging a less-specified, adaptive approach. This study also finds that four key network dimensions--structure, governance, composition, and purpose, help to explain the networks' designs for improvement. The key lesson of this study underscores the inherent complexity and interdependent nature of designing, managing, and studying educational networks.

CHAPTER 1

Introduction

Increasingly, educational networks are regarded as unique organizational arrangements capable of supporting large-scale instructional improvement.[1] As state and federal policies and policy movements, such as the Common Core State Standards (CCSS) and Every Student Succeeds Act (ESSA), embrace more rigorous standards for college-and-career-readiness, practitioners are expected to substantially change the way they conceptualize, organize, and enact instruction (Supovitz & Spillane, 2015).[2] In most cases, these reforms challenge schools to depart, quite markedly, from highly institutionalized methods, norms, and routines of teaching and learning to more ambitious instructional practices.

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[1] Beginning in the 1990s, scholars looked to educational networks as alternative models for improving schools (Firestone & Pennell, 1997). Since then, a steady line of research on school reform focuses on educational networks and network-based approaches to school improvement. I discuss this trajectory in more detail in Chapter Two. Selected leading research in this area includes: Barletta, Comes, Perkal, Shumaker, Wallenstein, & Yang, 2018; Berends, Bodilly, & Kirby, 2002; Chapman & Aspin, 2003; Cohen, Peurach, Glazer, Gates, & Goldin, 2014; Datnow, 2005; Firestone & Pennell, 1997; Glennan, Bodilly, Galegher, & Kerr, 2004; Katz, Earl, & Jaafar, 2009; Lieberman & Grolnick, 2005; Peurach, 2011; Peurach, Glazer, & Lenoff, 2014; Rowan, Barnes, & Camburn, 2004; Russell, Meredith, Childs, Stein, & Prine, 2015; Wohlstetter, Malloy, Chau, & Polhemus, 2003; Wohlstetter, Smith, & Gallagher, 2013.

[2] While standards-based reform is not a new phenomenon, the emphasis on rigor, inquiry, and critical thinking in the CCSS raised expectations for students and educators across the country (Massell & Perrault, 2014). Research comparing CCSS to previous state standards suggest these new standards would require considerable change "by asking educators to focus instruction on fewer topics attended to more deeply in mathematics; and on more complex, content-rich nonfiction, as well as fiction, in ELA" (Supovitz & Spillane, 2015).

Yet large-scale instructional reform has largely remained elusive in U.S. schools. Historically, a loose coupling among classroom instruction (on the one hand) and educational organizations and environments (on the other) has long buffered the technical core of teaching and learning from change (Weick, 1976; Meyer & Rowan, 1978). Some argue that this breach between the technical work of instruction and educational policy resulted in decades of "tinkering" along at the margins without actualizing any large-scale educational improvements in the core of teaching and learning (Cohen & Mehta, 2017; Tyack & Cuban, 1995).

Educational networks show the possibility for supporting large-scale instructional improvement given their potential for offering different models for organizing and managing the work of instruction (Peurach, 2011; Peurach, Glazer, & Lenoff, 2016), impacting classroom practice (Andrew & Rothman, 2002), and supporting large-scale change (Glazer & Peurach, 2012). Since the 1990s, activity around educational networks have been proliferating to include many types of networks existing in and around schools (Barletta et al., 2018; Wohlstetter & Lyle, 2018). In many cases, this activity has been increasing faster than scholars can research them. While a portion of the existing research on educational networks takes on matters of efficacy to improve outcomes (Bodily, Karam, & Orr, 2011; Borman, Hewes, Overman, & Brown; 2003; Boulay et al., 2018; Huang, 2018; Hutchings et al., 2012; Katz et al., 2008; Wohlstetter, Houston, & Buck, 2014) there is more limited research focused on understanding the core work of running educational networks that bring schools, teachers, and external organizations together in new ways around teaching and learning. As the activity around educational networks grows, there is a need to establish analytic frameworks that help researchers to 1) understand and reason about the core work of networks and 2) compare across different network types.

This study pushes this agenda forward by 1) developing an analytic framework for understanding educational networks and 2) empirically testing that framework using a cross-case analysis of two network designs. It also explores how key network dimensions, such as network governance, structure, composition, and purpose, create unique conditions under which these networks design, and explores the role of these features as potential explanatory factors in understanding the designs themselves.

Broadly speaking, networks are defined as a group of organizations working together to solve problems or issues of mutual concern that are too large for any one organization to handle on its own (Mandell, 1999). For purposes of this analysis, I consider networks as conceptualized by Wohlstetter and Smith (2000), who describe networks in education as schools and other organizations working together in a collaborative effort to more effectively enhance organization capacity and improve student learning than schools working on their own. This differs from other conceptualizations of networks that focus on groups of individuals working together, or more informal networks of individuals, groups, or organizations. Networks of this sort typically include a hub organization that collaborates with member schools around teaching and learning. Examples of educational networks as conceptualized here include groups of schools working in collaboration with charter management organizations (CMOs), educational management organizations (EMOs), external support providers, district central offices, among others.[3]

In the emerging research base on educational networks, most common are single case studies exploring the specific designs and outcomes of networks operating within specific

[3] The examples of educational networks identified here could be viewed from different perspectives. For example, KIPP CMO could be considered an alternative public-school system, a network, a professional community, etc. I privilege the network perspective in my analysis.

educational niches (e.g., charter market, public sector, and external support providers).[4] More limited research compares across multiple cases and across various market sectors to identify and compare network designs for instructional improvement.[5] This study contributes to the scholarly conversation around network instructional improvement by conducting a cross-case analysis of two network designs existing in different market sectors: one CMO and one external support provider. It also explores how key network dimensions, such as network governance, structure, composition, and purpose, serve as potential explanatory factors in understanding network designs themselves. In doing so, this study builds practical understandings of how various networks approach large-scale instructional improvement, and adds to conceptual understandings of how network dimensions help to explain these designs.

Research Questions and Study Overview

I use a comparative case study design to study two networks and their designs for instruction and instructional improvement. The following research questions guide this study:

[4] Selected samples of single site case studies of network instructional improvement include: Success for All (Peurach, 2011), Los Angeles Annenberg Metropolitan Project (Herman & Baker, 2003; Wohlstetter et al., 2003), America's Choice (Supovitz, Poglinco, & Snyder, 2001), and Knowledge is Power Program (KIPP) (Macey, Decker, & Eckes, 2009).

[5] Selected samples of comparative case studies of network instructional improvement include: New American Schools movement (Berends et al., 2002; Glennan et al., 2004), comprehensive school reform designs (Cohen et al., 2014, Rowan et al., 2004), and district and charter comparisons (Wohlstetter, Houston, & Buck, 2015).

1. In what ways do networks develop and coordinate designs for building educational infrastructure, supporting the use of educational infrastructure in practice, and managing performance?
2. In what ways do network structure, governance, composition, and purpose shape and influence the ways in which networks design for the aforementioned domains?

Setting and Cases

This study explores two school networks in New York City (NYC) actively working to support instruction and instructional improvement across a system of member schools. Apex, a CMO, and Novel, an external support organization, have distinct structures, histories, and purposes that shape the networks' designs for instructional improvement.[6]

Apex. Apex is a CMO that operates more than 30 public charter schools across five cities, a majority of which are located in NYC. Apex began in the late 1990s as a single school committed to closing the achievement gap, and it subsequently focused on outperforming local districts in student achievement. Building upon that mission, Apex expanded in both number of schools and location, and is now considered a leading CMO by *U.S. News and World Report*. As a CMO, Apex's central office (referred to in this analysis as the hub) provides an explicit set of services to member schools, including curriculum development, professional development (PD), recruitment of school leaders and teachers, school inspection and evaluation, facilities management, fundraising, and marketing.

[6] Pseudonyms have been used to represent the networks studied here.

Novel. Novel is an external support provider that operates alongside and under contract from the New York City Department of Education (NYCDOE) to provide support to district schools. As an external support organization, Novel works with a subset of district schools in select areas of support, namely in the areas of curriculum and instruction, leadership development, and data use. Novel began in the late 1980s as an organization focused on opening district schools during the small-school movement. The network has since shifted its focus to providing more instructionally-focused support to existing district schools.

Methodology

I addressed my research questions by using a qualitative, comparative case study design. Drawing on participant interviews, observations, and documents, I developed rich understandings of how these two educational networks approach instruction and instructional improvement in the context of CCSS implementation. A comparative case study design best supported my research aims by enabling both within case and across case analyses that allowed for exploration of multiple contributing factors leading to a given outcome (Moss & Haertle, 2015). Through this design, I developed understandings of each network's designs for instructional improvement, and compared across networks to identify and understand common features and key distinctions in approaches to instructional improvement. I also analyzed how key network dimensions, including network structure, governance, composition, and purpose, serve as potential explanatory factors for network designs themselves. I provide a detailed description of the methodology used in this study in Chapter Three.

Terminology

Throughout this dissertation, I use a range of terms particular to the phenomena of instructional improvement and network design. In an effort to be both clear and transparent about my conceptualizations, I describe those terms most central to this study in the following section as a way to better prepare and orient the reader.

Designs for Instructional Improvement

By designs for instructional improvement, I mean the formal organization of instruction and instructional supports driving teaching and learning. This includes the formal roles and responsibilities of organizational members, technical materials for instruction and support, processes/resources to guide social interactions around teaching and learning, and methods of coordinating across the aforementioned elements (Massell, Lyle, & Duff, forthcoming).

Educational Networks

Many types of networks exist in and around schools. Scholars apply the concept of networks broadly in the educational literature to include a diverse range of organizational relationships varied in its purpose, design, and configuration. As described earlier, networks in education suggest schools and other organizations/agencies working together in a collaborative effort to more effectively enhance organizational capacity and improve student learning than schools working on their own (Wohlstetter & Smith, 2000). Given the wide application of the concept of networks in education, I use a more specific description of educational networks to distinguish the organizations studied here.

This study focuses on what scholars describe as networks for school improvement (Barletta et al., 2018), school improvement networks (Peurach et al., 2016), affiliation networks (Smith and Wohlstetter, 2001), and inter-organizational networks (Wohlstetter & Lyle, 2019).

Educational networks of this sort reflect reform-oriented, inter-organizational networks where a central "hub" organization collaborates with "outlet" schools to enact schoolwide improvement programs (Peurach & Glazer, 2012). Regarded as "a new construct for conceiving of education provision and a new strategy for achieving reform" (Chapman & Aspin, 2003, p. 2.), these networks involve members who actively collaborate to develop and advance strategies for improving teaching and learning in schools (Wohlstetter & Lyle, 2019). Examples of such networks include: groups of schools operated by CMOs, groups of schools operated by comprehensive school reform designs (CSR), certain district-based networks, among others.

As conceptualized here, two primary components compose educational networks: hubs and member schools. Akin to central offices, hubs are network-level organizations that act as an organizing mechanism for the network as a whole. Network hubs are typically staffed independently from member schools and offer a particular set of supports to their members. Hubs often have organizational identities and goals that, although aligned, may be distinct from those of their member schools. Member schools are individual schools connected to the hub through an array of services and supports offered to them.

Continuous Improvement

By continuous improvement, I mean the ongoing, systematic process of producing, using, and refining the practical knowledge needed to make substantive changes in teacher and leadership practice. A goal of continuous improvement in education is to affect teaching and learning through the ongoing refinement of instructional designs in response to evidence of problems in achieving the core goals and purposes of the design. It is a process that goes beyond (a) holding members accountable for implementing the instruction design and (b) measuring

effectiveness. Specifically, it moves members toward an iterative process in which they identify problems of practice, devise and test solutions, and revise in response.

Fidelity-based and Adaptive Approaches

Historically, many scholars put reform initiatives into one of two broad categories: those emphasizing control and fidelity and prioritizing local commitment and adaptation (March, 1991; Rowan, 1990; Supovitz & Spillane, 2015). Fidelity-based approaches strongly emphasize standardization to a "well-defined set of instructional practices" (Rowan & Miller, 2007, p. 253). Explicit instructional guidance, on-site coaching and implementation support, and monitoring of fidelity drives this approach (Rowan & Miller, 2007). Adaptive approaches emphasize instructional innovation through discovery and dissemination of locally developed, effective teaching practices that practitioners adapt for their own classroom (Rowan & Miller, p. 254).

Traditionally, fidelity-based and adaptive approaches have been presented as mutually exclusive. A developing body of research, however, suggests that networks can intentionally design strong programs of support that provide explicit guidance while also encouraging local innovation (Peurach & Glazer, 2012; Peurach, Glazer & Lenoff, 2016). I use the terms fidelity-based and adaptive approaches to instructional improvement as key descriptors for the network designs presented here.

Preview of Findings

This study finds that Apex and Novel have fundamental differences in their approaches to instructional improvement. Apex's design uses a highly-specified, fidelity-based approach to instructional improvement by (a) establishing an explicit and actionable educational infrastructure, (b) supporting educational infrastructure in practice, and (c) tightly managing performance. The network's centralized structure, authority over member schools, more

homogenous composition, and focus on replication of its design in new contexts helps to explain Apex's approach to instructional improvement. Novel's design uses a more adaptive approach to instructional improvement. It provides (a) a comparatively less comprehensive array of educational infrastructure, support for educational infrastructure use in practice, and mechanisms for managing performance and (b) supports teachers and school leaders in their own instructional decision-making. The network's decentralized structure, limited authority over member schools, heterogeneous composition, and developing design helps to explain Novel's particular approach to instructional improvement.

Overview of the Dissertation

I organize the remainder of this dissertation to tell the story of Apex and Novel and their approaches to network instructional improvement through the context of implementation of the CCSS. My goal is that through this experience, the reader will come away with new understandings of how educational networks support large-scale instructional improvement, and how network dimensions can help scholars and practitioners to understand the designs themselves. With this aim, I organize the rest of this dissertation as follows:

In Chapter Two, I review theoretical and empirical studies related to educational networks and instructional improvement in order to build a rationale for the study presented here.

In Chapter Three, I present the research design and methodologies of this study, including case selection, data collection methods, methods of analysis, and study limitations.

In Chapters Four, Five and Six, I present the study findings. In Chapter Four, I present and compare the designs for educational infrastructure in each network. In Chapter Five, I present and compare the designs for supporting the use of educational infrastructure in practice

in each network. In Chapter Six, I present and compare designs for managing performance and continuous learning and improvement in each network.

In Chapter Seven, I review major findings from this study. I suggest ways these findings might contribute to scholars' growing understandings of the role of educational networks in large-scale instructional improvement. I pay particular attention to the theoretical and practical implications of this study, and identify future areas of research.

In Chapter Eight, I offer concluding thoughts from this study.

CHAPTER 2

Analytic Framework

Increasingly, educational networks are regarded as unique social arrangements capable of supporting educational reform (Firestone & Pennell, 1997; Lieberman & Grolnick, 2005; Peurach, et al., 2016; Wohlstetter & Lyle, 2018). This form of organization in education follows similar trends in other sectors characterized by an increasing role of networks in organizational management (Borgatti & Foster, 2003; Lawler, Mohrman, & Benson, 2001; Powell, 1990), policy (Kenis & Schneider, 1991; Marin & Mayntz, 1991; Peters & Pierre, 1998), and community organization (Lieberman & Grolnick, 2005; Schuler, 1996). Educational scholars regard networks as a strategy for developing structures more flexible, responsive, and innovative than those of bureaucratic organizations (Dolle, Gomez, Russell, & Bryk, 2013; Firestone & Pennell, 1997; Lieberman, 2000; Popp, Milward, MacKean, Casebeer, & Lindstrom, 2014).

Since the 1990s, activity around educational networks have been proliferating to include many types of networks existing in and around schools (Barletta et al., 2018; Wohlstetter & Lyle, 2018). In many cases, this activity has been increasing faster than scholars can research them. A portion of the existing research on educational networks takes on matters of efficacy to improve outcomes (Bodily, Karam, & Orr, 2011; Borman et al.; 2003; Boulay et al., 2018; Huang, 2018; Hutchings et al., 2012; Katz et al., 2008; Wohlstetter, Houston, & Buck, 2014). There is more

limited research focused on understanding the core work of running educational networks that bring schools, teachers, and external organizations together in new ways around teaching and learning. As the activity around educational networks grows, there is a need to establish analytic frameworks that help researchers to 1) understand and reason about the core work of networks and 2) compare across different network types.

One developing area of research on educational networks focuses on what are identified as networks for school improvement (NSI). NSI refers to inter-organizational networks comprised of members who actively collaborate to develop and advance strategies for improving teaching and learning in schools (Wohlstetter & Lyle, 2018).[7] Their work includes establishing designs for instruction and instructional improvement and supporting schools in using those designs (Massell et al., forthcoming; Peurach et al., 2016). NSI differs from other types of educational networks in that they are intentionally formed, can be highly structured, and aim to address high-leverage practical problems (Russell et al., 2015). As described previously, networks of this sort typically organize with a central hub working with member schools around instruction and instructional improvement. Examples of NSI include those run by certain CMOs, EMOs, district central offices, and external support providers that operate as hub organizations. I position my research squarely within this growing niche of research on educational networks.

This chapter examines the role of NSI in large-scale school reform efforts. In this chapter, I give particular attention to the key domains of activity for NSI, and the theoretical

[7] NSIs have many names in the school reform literature, including school improvement networks (Peurach & Glazer, 2012; Peurach, et al., 2014), intermediary organizations (Coburn, 2005; Honig, 2004; Park & Datnow, 2008), inter-organizational networks (Chapman & Aspin, 2003; Wohlstetter & Lyle, 2019), network improvement communities (Bryk, Gomez, Grunow, & LeMahieu, 2015), and others. I choose to apply the term networks for school improvement used by the Bill and Melinda Gates' Networks for School Improvement Initiative and Barletta et al. (2018) to align my language with the most emerging research in this area.

considerations for scholarship in this area of research. I do this to (a) provide a rationale for the role of NSI in large-scale school reform efforts and (b) build context for an emerging research agenda for network instructional improvement. I begin by describing NSI as a potential solution to critical challenges in school reform. I then describe the landscape of scholarship on NSI, focusing on the key functions of NSI and on emerging theoretical work in this area. I conclude by presenting a preliminary analytic framework informed by the literature in this area, and identifying a set of empirical questions and provisional conjectures to guide my work.

The Problem

As long argued in the literature on school reform, the technical core of teaching and learning has been difficult to penetrate given the loosely coupled nature of U.S. schooling (Weick, 1976; Meyer & Rowan, 1978).[8] Researchers attribute loose coupling, in part, to the lack of technical accountability (Meyer & Rowan, 1977, 1978) and educational guidance (Cohen & Mehta, 2017; Cohen, Spillane, & Peurach, 2017) in schooling. Historically, U.S. public schooling has not organized around the work of instruction (Cohen & Mehta; 2017; Cohen & Moffit, 2009; Cohen, Spillane, & Peurach; 2017; Peurach, Cohen, Yurkofsky, & Spillane, in press). Rather, schools were judged by normative beliefs about the characteristics of successful schools, such as organizing students into age-graded classrooms, employing certified teachers, and instituting graduation requirements (Meyer & Rowan, 1977, 1978; Metz, 1989; Peurach et al., in press). The primary responsibility for organizing and managing instruction was delegated

[8] As described by Weick (1976), loosely coupled involves elements or events that are responsive, but where each element or event also preserves its own identity and separateness (p. 3). In a loosely coupled design, components are independent, and changes in one will not affect the operation of others. Conversely, a tightly coupled design means that components tend to be interdependent. Changes in a single component can have a system-wide impact.

to local educational agencies (LEAs) who often delegated this work to individual teachers (Cohen & Spillane, 1992; Cohen et al., 2017; Lortie, 1975; Meyer & Rowan, 1978).

In the absence of a set of commonly-held, system-wide conceptions of high-quality instruction, and in the absence of technical guidance and accountability at the state or federal levels, few LEAs developed coherent programs of instruction to support instructional improvement (Cohen et al., 2017; Goldin & Katz, 2009). Instead, individual teachers served as the main arbiters of instruction, deciding what and how to teach the students in their classrooms (Cohen et al., 2017). As such, some argue that school reform efforts resulted in decades of "tinkering" on the margins without actualizing any large-scale educational improvements in the core of teaching and learning (Tyack & Cuban, 1995; Cohen & Mehta, 2017).[9]

Contemporary educational policy seeks to couple the work of instruction with broad goals for teaching and learning in the effort to improve student achievement. Yet by and large these efforts have produced modest results system-wide. One of the leading policy paradigms of the past several decades focused on establishing standards and accountability for teaching and learning, but gave limited attention to establishing substantive technical guidance to support classroom instruction.

The policy logic under standards-based reform suggests that strict accountability will encourage states and districts to develop solutions to improve teaching and learning in schools and increase student achievement (Smith & O'Day, 1990). For example, in the 1980s and 1990s,

[9] Cohen and Mehta (2017) identify several features that contribute to underwhelming results of large-scale school reform efforts. One is the open structure and weak control in the education sector, where limited federal power over educational decision-making minimized the federal government's ability to "provide the tools, materials, and practical guidance needed to enact its ambitions" (Cohen, 2011; Cohen & Moffitt, 2009). Another is the vulnerability of public schools to local public opinion and political pressures that undermined particular reform policies. A third is weak professional control over the work of teaching and learning as evidenced by the lack of self-regulation, licensing, and standards development for the profession. A final feature is the sharp division between public and private schools.

states increased technical pressures on schools by implementing loose, state-developed standards and monitoring student achievement toward these standards (Massell, Kirst, & Hoppe, 1997). In 1994, the federal government solidified instructional standards by codifying standards into state law under the Improving America's Schools Act (IASA). The passage of No Child Left Behind (NCLB) in 2001 raised the stakes for school reform by mandating states hold schools accountable for student achievement through annual standardized testing. More recently, CCSS and ESSA continue to use standards and accountability as key levers for improving teaching and learning in schools by establishing more rigorous standards and performance management.

The early wave of standards-based reform marked a critical step in efforts to tighten coupling between schools and the policy environment. Many schools responded in ways that moved beyond buffering and decoupling (Rowan, 2006) and introduced some changes in the technical core. Scholars raise questions, however, about the extent to which these policies altered teaching and learning on a large scale (Cohen & Mehta, 2017; Cohen, Moffitt, & Goldin, 2007).[10] In particular, these policies failed to offer the infrastructure and technical guidance that would enable a change in practice (Cohen, et al., 2007). Instead, local districts and classroom teachers were responsible for developing many of the technical resources and guidance to support more ambitious teaching (Rentner, Kober, Frizzel, & Ferguson, 2016).

Yet, more robust responses to standards-based reform have been successful in certain

[10] Research on standards and accountability identifies reasons for the limited impact of early standards-based reforms on practice. For instance, some states instituted low standards or low proficiency rates to avoid federal sanctions (Peterson & Hess, 2006), undermining the integrity of the reforms. Instructional changes as a result of increased standards and accountability often involved "highly teacher-centered lessons...with diminishing student choice of activities, cross-disciplinary content in lessons, project-based learning, and, in general far less student-centered teaching (Cuban, 2013, p. 81). Some have also reported that NCLB and earlier efforts at SBR led to a narrowing of curriculum in some cases, with schools focusing almost exclusively on tested subjects, and far more teaching to the test (Jennings & Bearek, 2014; Desimone, 2013; Smith & Kovacs, 2011).

niches of the educational landscape (Cohen & Mehta, 2017). Outlying local districts, CMOs, and CSRs designed ways to build policy intentions of standards-based reform into the technical work of schools. For example, District 2 in NYC produced rapid improvement in student achievement in a highly diverse district by using a set of organizing principles and specific processes for collaboration and knowledge sharing (Elmore & Burney, 1997). In Duval County, Florida, district leaders partnered with America's Choice (a leading CSR model) to develop an aligned approach to continuous improvement using trainings, routines, and data systems targeted at all levels of the district (Supovitz, 2006). Other examples of aligned instructional models include high-performing CSRs (e.g. America's Choice, Success for All, and Core Knowledge) and those of CMOs (e.g. KIPP, Achievement First, and Uncommon Schools). For example, Success for All organizes its network around comprehensive supports for teaching and learning, including curriculum, instruction, organization, PD, and parent involvement. They use robust designs and practical methods to develop the organizational and human capacity necessary to improve schools (Cohen et al., 2014; Datnow, 2005; Peurach, 2011).

Common to all these designs is that they organize networks of schools explicitly around the work of teaching and learning, and provide a level of technical guidance and educational infrastructure to support improvement in practice. This is in contrast to the more loosely coupled organization of educational systems that left the management and organization of instruction to teachers in individual classrooms. It is also in contrast to the overarching logic of standards-based reform that places the onus for instructional improvement mostly on local educators.

Despite successful school reform found in niches of the educational landscape, these examples are the exceptions, not the rule (Peurach et al., 2016). Educational policy continues to use the logic of standards and accountability to improve practice as evidenced by the adoption of

the CCSS and the solidification of college-and-career readiness standards (CCRS) under ESSA. This continues to leave districts and schools to figure out how to work within these broad guidance/resources/incentives to improve instruction and outcomes. While the CCSS and CCRS reflect a new, even more ambitious wave of standards-based reform, a similar challenge remains: how can districts and schools organize themselves to support ambitious improvement in classroom instruction, and do so at scale?

The Solution

In order to achieve the aim of supporting large-scale instructional improvement in the U.S., some suggest a systemic recalibration toward more instructionally-focused education systems are needed (Peurach et al., in press). As described by Peurach et al. (in press), an instructionally-focused education system is one in which government agencies and others interact in positive, mutually-reinforcing ways to organize and manage instruction (p. 10). This is in contrast to educational systems that delegate the primary responsibility for managing teaching and learning to individual teachers, and do little to organize around commonly-held conceptions of high-quality instruction or provide technical guidance to system members.

Scholars are beginning to conceptualize and theorize about what it is instructionally-focused educational systems do. Research in this area emphasizes five core domains of activity as integral to transforming districts as engines of mass public schooling into instructionally-focused education systems (Peurach et al., in press). These include:

1. managing environmental relationships
2. building educational infrastructure
3. supporting the use of educational infrastructure in practice
4. managing performance
5. distributing instructional leadership

As the authors describe, "the more attention to (and coordination among) these domains of activity, the farther districts move in the direction of coherent, instructionally-focused education systems" (Peurach et al., in press, p. 17). Table 2.1 describes each of the five core domains of functional education systems as identified by Peurach et al. (in press).

Table 2.1: Core Domains of Instructionally-focused Education Systems

Domain	Description
Managing environmental relationships	To selectively bridge, buffer, and reconcile among competing influences and resources in local and broader environments that bear on how the district understands and pursues excellence and equity in classroom instruction: e.g., family/community aspirations and values, federal and state policies, philanthropists' agendas, and educational research and resources (Honig & Hatch, 2004; Spillane, 2009).
Building educational infrastructure	To coordinate visions for instructional practice, formal instructional resources (e.g., instructional models, curricula, and assessments), and social instructional resources (e.g., understandings, norms, values, and relationships among teachers, leaders, and students) (Hopkins, Spillane, Jakopovic, & Heaton, 2013; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Peurach & Neumerski, 2015).
Supporting the use of educational infrastructure in practice	To develop teachers' professional knowledge and capabilities through such means as workshops, practice- based coaching and mentoring, and collegial learning (Cohen, 2011; Cohen, Raudenbush, & Ball, 2003).
Managing Performance	To manage both for continuous improvement (e.g., via iterative, evidence-driven design, implementation, and evaluation) and for accountability (e.g., via the use of evidence and standards to assess instructional processes and outcomes) (Boudet, City, & Murnane, 2005; Bryk et al., 2015, Gomez, Grunow, & LeMahieu, 2015; Mintrop, 2016).
Distributing instructional leadership	To distribute beyond established administrative roles to new leadership roles and teams responsible for performing, coordinating, and managing all of the preceding (Elmore, 2000; Spillane, 2006).

NSI as a Vehicle for Reform

NSI have emerged as organizational types with the potential to take up the aforementioned domains of work of instructionally-focused educational systems. These networks advance different types of educational models with a potentially keen(er) ability to organize and manage the work of instruction. In recognizing the potential role of NSI in supporting large-scale school improvement, two key matters surface as critical to understanding this work. The first matter is understanding how networks organize to support teaching and learning. This includes understanding network designs for instruction and instructional improvement and how designs function in practice. The second matter is beginning to identify and examine key elements that shape how and why networks design and function in the ways that they do. To address these matters, I explore the growing research on NSI in order to develop a preliminary analytic framework to support empirical and theoretical research in this area.

Mapping the Terrain: Types of NSI

As described previously, since the 1990s activity around networks in education have proliferated to include a range of network types existing in and around schools (Barletta, 2018; de Lima 2010; Wohlstetter & Lyle, 2018). While most NSI seek to improve teaching and learning through collaboration, these networks vary in substance and structure. In this section, I provide a brief overview of the range of NSI, and highlight key areas of distinction across network types. In doing so, I begin to etch out a research agenda in this area.

NSI reflect a specific type of educational network. As described in the previous chapter, NSI typically organize with a central hub working with member schools around instruction and instructional improvement. Networks of this sort differ from more professional networks that serve to connect individuals with one another for the purposes of networking/collaborating to achieve

their own specific goals (Lichtenstein, McLaughlin, & Knudsen, 1992; Lieberman, 2000; Lieberman & Wood, 2003; Little, 1993). One example of a professional network is the National Writing Project that connects teachers through learning communities focused on teachers-teaching-teachers around writing instruction (Gray, 2000; Lieberman & Wood, 2003). In contrast, NSI involve inter-organizational networks comprised of members and a hub who actively collaborate to develop and advance strategies for improving teaching and learning in schools (Wohlstetter & Lyle, 2019).

Early types of NSI varied along a range of dimensions, including structure of the hub, network purpose, among others. One of the earliest examples of NSI emerged out of the Annenberg Challenge, which funded school reform efforts in locally-designed networks in nine urban areas and one rural district (Cervone & Cushman, 1999; Wohlstetter et al., 2003; Wohlstetter & Lyle, 2018). In the Los Angeles Metropolitan Area, for instance, Annenberg networks were comprised of 'school families' of high schools and their feeder schools working alongside school districts in Los Angeles County. These networks had a decentralized structure where members worked collaboratively through cross-site teams to reform literacy instruction across the network (Wohlstetter et al., 2003).

Other early types of NSI included CSR models and CMOs. These NSI had more centralized networks with stronger hubs taking an active role in organizing and implementing designs for school improvement. The purposes of these networks varied in scope, ranging from a broad focus on increasing educational opportunities for all students, to a narrower focus on improving literacy instruction, for example (Wohlstetter & Lyle, 2018). For instance, Success for All (a leading CSR) supported schools in reaching on-grade level reading achievement in grades K-6 (Peurach, 2011). Other CMOs, such as KIPP and Uncommon Schools, focused more

broadly on providing school-wide instructional and operational support across their network (Gleason, Tuttle, Gill, Nichols-Barrer, & Teh, 2014; Henig, 2008; Teh, McCullough, & Gill, 2010).

More recently established NSI also vary along a range of dimensions. In addition to distinctions in hub structure and purpose, NSI vary with regards to geographic region and market sector. For instance, school reform in NYC in the mid-2000s established clusters of K-12 schools that self-arranged in what were known as Children First Networks (CFNs). The purpose of CFNs was to provide broad instructional and operational support to their member schools in the roughly 60 networks developed across the city (O'Day, Bitter, & Gomez, 2011; Wohlstetter, et al., 2015; Wohlstetter & Lyle, 2018). CFNs reconstituted traditional boundaries by reconfiguring the geographic-based NYCDOE structure to network schools across city regions. Other NSI span across larger geographic regions. For example, large CMOs (e.g. KIPP, Uncommon Schools, and Achievement First) and CSRs (Success for All and America's Choice) operate networks across states and regions

NSI also vary with regards to market sector. For instance, CFNs are examples of district-based NSI that operate directly as part of the public-school sector. Others, like CSRs, exist in the private sector, but work with public schools and districts. Some are philanthropic, such as the recent Bill and Melinda Gates Foundation project on networks for school improvement. These networks focus on groups of secondary schools working in partnership with intermediary organizations to achieve a common goal using continuous improvement methods (Barletta et al., 2018). Others support collaboration across institutions. For instance, research-practice partnerships organize long-term collaborations between practitioners and researchers to investigate problems of practice and develop solutions for improving schools and school districts

(Coburn, Penuel & Geil, 2013; Coburn & Penuel, 2016; Fishman, et al., 2013; Penuel & Gallagher, 2017).

The wide-range of networks working in and around schools underscores the growing interest and activity around educational networks as vehicles for large-scale instructional reform. Given this interest and activity, scholars are working to better understand how these networks function to support improvement in practice. While a portion of the existing research on educational networks takes on matters of efficacy to improve outcomes (Bodily, Karam, & Orr, 2011; Borman et al.; 2003; Boulay et al., 2018; Huang, 2018; Hutchings et al., 2012; Katz et al., 2008; Wohlstetter, Houston, & Buck, 2014) there is more limited research focused on understanding the core work of running networks of this sort. This includes the organization of these networks, as well as their designs for improvement.

Core Domains of Activity in NSI

The proliferation of activity around networks in education has outpaced empirical and theoretical research in this area. As the activity around educational networks grows, there is a need to establish analytic frameworks that help researchers to 1) understand and reason about the core work of networks and 2) compare across different network types. In the existing research on NSI, most common are single case studies exploring the specific designs, implementation, and outcomes of networks engaged in this work.[11] While these single case studies provide descriptive and nuanced accounts of NSI approaches to instructional reform, I choose to focus here on a smaller subset of the literature that provides comparative perspectives on network improvement

[11] Selected samples of single site case studies of network instructional improvement include, on Success for All, Peurach (2011), on Los Angeles Annenberg Metropolitan Project, Herman and Baker (2003) and Wohlstetter et al. (2003), on America's Choice, Supovitz, Poglinco and Snyder (2001), on Knowledge is Power Program (KIPP), Macey, Decker and Eckes (2009).

strategies with the purpose of using this scholarship to frame and guide further comparative research.

In examining leading comparative studies on NSI, I identify three central and interdependent themes regarding network improvement. These themes directly reflect three of the five core domains of instructionally-focused education systems identified by Peurach et al. (in press) which include: building educational infrastructure, supporting the use of educational infrastructure in practice, and managing performance. In this section, I elaborate on these three core domains of activity as identified in leading comparative studies of NSI.[12]

Building Educational Infrastructure

A review of comparative research identifies building educational infrastructure as central to the work of supporting instructional improvement across a network of schools. I define educational infrastructure as "the coordinated roles, structures, and resources that school systems design and use to support and coordinate instruction, maintain instructional quality, and enable instructional improvement" (Cohen, Spillane, & Peurach, 2018, p. 2).[13] As described by Peurach et al., (in press), building an educational infrastructure serves to coordinate visions for instructional practice, formal resources for instruction (e.g., instructional models, curricula, and assessments), and social resources for instruction (e.g., understandings, norms, values, and relationships among teachers, leaders, and students) (p. 17).

[12] The two other core domains of functional education systems identified by Peurach et al., managing environmental relationships and distributing instructional leadership, are also reflected in the comparative literature on NSI. However, I chose to focus on the three domains highlighted above as they appear most central to the work of NSI given my reading of the literature and best reflect the domains of activity addressed in this dissertation. Future research in this area should consider attending more specifically to the two domains of activity not explicitly addressed in this study.

[13] A body of scholarship on school reform addresses the role of educational infrastructure in instructional improvement. For further discussion of educational infrastructure see Cohen, et al., 2013; Hopkins, Spillane, Jakopovic, & Heaton, 2013; Peurach & Neumerski, 2015; Woulfin, 2015.

Table 2.2: Sample Elements of Educational Infrastructure

Sample Elements
Instructional vision
Instructional models
Codified practices
Curricula
Assessments
PD
Formal roles and associated functional responsibilities
Human resources infrastructure (e.g. hiring, assigning, and retaining polices; performance incentives)
Resource allocation
Timelines
Systems of data collection and accountability
Designs and codified messaging for culture and core beliefs
Resources and tools to actualize culture and core beliefs in practice
Collaborative work structures to support practice

*These elements draw on the research from Bullard & Taylor, 1994; Datnow, Hubbard, & Mehan, 2005; Desimone, Porter, Garet, Yoon, & Birman, 2002; Hopkins et al., 2013; Leithwood et al., 2004; Peurach & Neumerski, 2015; Rosenholtz, 1991.

NSI vary in the substance and specificity of educational infrastructure embedded within its designs for instruction and instructional improvement. For example, in comparative work on CSR, Cohen et al. (2014) identifies three unique models for school improvement: one providing guidance around school culture, organization, and ideas, but relatively modest technical guidance for instructional programming and curricula; another with very detailed technical guidance around curriculum and instruction; another providing a level of technical guidance around practice but relying on teachers' expertise and capacity for guidance use. Similarly, Datnow, Hubbard, and Mehan's (2005) research on scaling-up educational reforms identifies a wide variety of designs ranging along "a continuum of those that are highly specified and provide

curriculum, lesson plans, school organizational models, implementation plans, and PD, to those that are much less specified, asking schools to commit to a guiding set of principles and engage in an inquiry-guided, locally-driven process of self-renewal" (p. 4).

In most NSI designs, the building of educational infrastructure goes beyond developing/curating formal instructional resources, such as curriculum materials, assessments, and other resources, to establishing a coordinated set of social resources for instruction (e.g., understandings, norms, values, and relationships among teachers, leaders, and students) to guide resource use in practice. These understandings, norms, values, and relationships about instruction reside within people in the network, and, like the formal resources for instruction, must be established, cultivated, and recreated. Not attending to the social features within a network can complicate the hub's ability to support educational infrastructure use in practice and to monitor performance.

For example, Accelerated Schools (a CSR) built its design around a three-pronged philosophy focused on the beliefs that students should be treated as gifted and talented, that ambitious academic content would deeply engage students, and that a focus should be placed on strengths rather than deficits (Cohen et al., 2014). This network used a multiyear process for internalizing and applying this philosophy in practice to establish these norms and values within schools. Other NSI designs for educational infrastructure created new relationships among network member by reshaping roles and responsibilities within schools and in the network. (Glennan et al., 2004; Datnow et al., 2002; Stringfield et al., 1996). The Success for All model, for instance, created leadership teams headed by a reading facilitator to support teachers and students in the use of their design (Cohen et al., 2014; Peurach, 2011; Slavin, 1996). This altered the ways in which network members worked together in support of instruction and instructional

improvement. Other NSI, particularly CMOs, also create robust infrastructure for managing staff personnel, such as hiring, recruitment, and retention processes and policies (Farrell, Wohlstetter, & Smith, 2012; Lake, Dusseault, Bowen, Demeritt, & Hill, 2010).

Comprehensive, coordinated educational infrastructure-- both the formal instructional resources and social instructional resources-- is in contrast to the type of organization typically found in large-scale school reform efforts. As described earlier, contemporary educational reform efforts often rely on a standards and accountability logic for large-scale school improvement, which delegates educational infrastructure development mostly to local educators. A primary means of doing so is to cull resources from the school improvement industry with commercial publishers, non-profits, and other organizations developing formal resources for instruction (Rowan, 2002; Peurach et al, in press). Evidence from the work of leading NSI suggests that networks themselves engage in the building of educational infrastructure to provide a level of technical guidance and resources to member schools, while also establishing processes and resources to support social configurations across a network of schools.

Supporting Educational Infrastructure Use in Practice

Another core domain of activity for NSI is providing ongoing and sustained support for educational infrastructure use in practice. Scholars identify implementation supports as critical for reforms to take root and scale-up (Berends, et al., 2002; Cohen, et al., 2014; Glennan et al., 2000; Stringfield et al., 1996), and pinpoint several components as essential to supporting infrastructure use in practice. One such component is that support for implementation works best if tightly linked to the program design (Stringfield et al., 1996). Examples of such supports include: PD and training, joint work opportunities, and coaching around program resources and their use. Another component is support for educational infrastructure use in practice should be

ongoing and intensive and should include site-based support (Glennan et al., 2000). For NSI that span across geographic areas, those with regional offices or school liaisons focused on providing school-based support were associated with more successful implementation (Glennan et al., 2000). A third component is that deep attention should be given to adopters' needs through the implementation process (Glennan et al., 2000). This means that although common curricula, practices, and processes may be consistent across the network, attention should be given to the particular needs of local schools during implementation, and program designs should have some flexibility to accommodate local needs (Glennan et al., 2000).

Table 2.3: Mechanisms for Supporting Educational Infrastructure Use in Practice

Mechanisms
PD
Joint Work Opportunities
Coaching
Site-based Teams
Site Visits
Observations and Feedback
Data Use
Strategic Planning

*These elements draw on the research from Berends et al., 2002; Cohen et al., 2014; Datnow et al., 2005; Glennan et al., 2000; Wohlstetter et al., 2016.

Scholars point to several challenges that complicate implementing supports in network instructional improvement. One such challenge is that school conditions can significantly impact implementation, including teacher buy-in, principal support, and alignment of policies and infrastructure in the operating environment (Glennan et al., 2000). As identified across comparative studies, staff selection of network designs has been associated with more successful implementation, as have been implementation efforts where active and ongoing principal support

is present (Berends, et al., 2002; Glennan et al., 2000). Moreover, environments with supportive district contexts that provide continual resources for reform and coherent alignment of policies and mandates around reform have also shown evidence of improving implementation efforts (Berends, et al., 2002; Glennan et al., 2000).

Another challenge to implementation is the ability of NSI to provide intensive and ongoing on-site support to build the professional capacity of practitioners to implement the networks' instructional design (Berends et al., 2002; Glennan et al., 2000; Stringfield et al., 1996; Wohlstetter et al., 2016). As identified by scholars, small network staffs and limited proximity to schools complicates a network's ability to provide intensive and on-site support for implementation (Wohlstetter et al., 2016). Instead of relying exclusively on external support, studies of CSR identified a benefit in using on-site facilitators, either from the network hub or school staff member, to provide ongoing assistance and technical support, including modeling of practice and feedback to practitioners (Glennan et al., 2000).

Third, the complexity of the program design itself complicates a network's ability to support educational infrastructure use in practice. As described by Cohen et al. (2014), as the program design becomes more complex, so does the implementation process. As a result, designs for supporting educational infrastructure in practice become more intricate as network infrastructure develops and evolves. This suggests that what it takes to support implementation across a network changes over time, particularly as networks scale-up and refine their designs.

Managing Performance

Beyond building educational infrastructure and supporting educational infrastructure use in practice, another core function of NSI is managing network performance. This includes managing performance for both accountability and continuous improvement (Peurach et al., in

press). By continuous improvement, I mean the ongoing refinement of instructional designs in response to evidence of problems in achieving the core goals and purposes of the design.

With standards-based reform solidifying strict accountability for student achievement, school districts are now responsible for managing educational performance in schools which reflect a relatively new domain of work (Lake & Hill, 2009). District monitoring systems typically entail annual achievement testing, and the collection of demographic data used to compare student achievement, assess achievement in learning outcomes over time, and determine whether inequalities in achievement exist among students with differing demographics (Willms, 2000). For some NSI in particular, mechanisms for accountability monitoring are built into the network's educational infrastructure, including ongoing assessments of student learning and processes for analysis of student data.

A central finding from comparative research on NSI indicates that network instructional reform is a necessarily complex and iterative process, and that network designs themselves develop and change over time (Berends et al., 2002; Cohen et al., 2014; Glennan, et al., 2000). NSI designers themselves are learning to do this work as programs go live in schools, and, at best, these programs are initially able to develop base-level practices to guide network-wide improvement (Cohen et al., 2014). To develop more expert level practices requires time, learning, and refinement across the network as a whole. It is through the continuous learning and refinement of network designs over time that enables NSI to substantively support instructional improvement (Barletta, 2018; Cohen et al., 2014; Peurach, 2011; Peurach, et al., 2016).

Moreover, NSIs compete in markets where effectiveness increasingly matters, and in environments in which legitimacy is increasingly linked to effectiveness. NSI must continually learn from and improve upon their design in order to remain competitive. This suggests an

incentive to move beyond managing for accountability alone to managing network performance for continuous improvement of the overall network design.

Scholars of NSI are beginning to capture what mechanisms help networks to engage in continuous learning and improvement. As described in the literature on organizational learning and continuous improvement in schools, Supovitz (2009) identifies four key elements for dynamic learning processes. These include: 1) *data capture*, where organizational members decide what data are related to the organization's core processes important for them to investigate and capture; 2) *meaning making*, where data are interpreted and converted into information; 3) *information sharing*, processes where data are shared across the organization, and 4) *embedding learning*, which includes the formal ways organizations utilize newly gained knowledge by building said knowledge into the regular processes of the organization (Supovitz, 2009, p. 710).

Table 2.4: Elements of Dynamic Learning Processes (as identified by Supovitz, 2009)

Elements of Dynamic Learning Processes	
Data capture	Mechanisms for organizational members to decide what data are related to the organization's core processes important for them to investigate and capture.
Meaning making	Opportunities for data to be interpreted and converted into useable information.
Information sharing	Processes where data are shared across the organization. Includes structures for bilateral communication and sharing.
Embedding learning	Includes the formal ways organizations utilize newly gained knowledge by building said knowledge into the regular processes of the organization.

More contemporary research on network improvement suggests that those NSI that intentionally design these features into improvement strategies are better equipped to actualize continuous learning and improvement (Peurach, et al., 2016). Scholars describe organizations with this capability as evolutionary enterprises "in which hubs and schools engage in collaborative learning that yields a formal knowledge base detailing where, what, and how to replicate" (Peurach et al., 2016, p. 623).

Scholarly descriptions of network continuous learning and improvement underscore several essential components in a network's ability to learn. First, the network benefits from a level of standardization of its work. As described above, part of the work of NSI is to build the educational infrastructure necessary for improvement. A robust educational infrastructure, such as common visions of instruction, curriculum, and assessments, enables the network to establish certain base-level practices around which the network can learn (Massell et al., forthcoming; Peurach, et al., 2016). This is in contrast to the status quo where highly idiosyncratic and varied infrastructure and practices among schools and classrooms complicate meaningful co-engagement in practice and its improvement.

Educational infrastructure also helps to develop common language and practices that can facilitate collaboration and discourse within the organization. Continuous learning also depends upon strong feedback loops and bi-lateral channels of communication operating across multiple levels of the network. This supports critical information sharing from the hub to member schools and from member schools to the hub (Peurach et al., 2016; Senge, Kleiner, Roberts, Ross, & Smith, 1994). NSI also benefit from intentional designs for vertical and horizontal collaboration across the network. This provides critical opportunities for collective sense-making for hub and

school personnel, and opportunities for network members to embed ongoing learning into their instructional design (Massell et al., forthcoming).

Theoretical Conceptions of Network Improvement

While scholars continue to build practical and conceptual understandings of the key functions of NSI, the field is also pushing to establish more theoretical considerations of networks as an analytic concept in education. This theoretical push is in response to the evolving use of the term networks as a catch-all organizational form synonymous with widely-used constructs such as, "alliances, coalitions, collaborations/collaboratives, clusters, consortia, development groups, families, partnerships, federations, groupings, territories, trusts, and zones" (de Lima, 2010). Scholars acknowledge a need to develop theoretical conceptions of networks in education to support more substantive and descriptive analysis of networks, and to establish a more systematic research agenda within the community (de Lima, 2010, Russell et al., 2015). In this section, I identify the emerging theoretical scholarship around conceptual understandings of networks and use this to establish an agenda for ongoing research in this area.

Identifying Network Dimensions

Theoretical work in this area focuses on identifying key dimensions of networks in education as a means of driving more systematic and descriptive analysis in the field (de Lima; 2010, Russell et al., 2015; Wohlstetter & Lyle, 2019). Educational scholars lean on conceptual work in other fields-- namely network governance in public policy and organizational management-- and apply these concepts to networks in education. Appendix A presents summary tables of leading theoretical work on network dimensions identified by scholars of educational reform. As scholars theorize around a range of dimensions that characterize networks in education, I pull forward four dimensions that appear to be central to many of these

characterizations. These dimensions include: *network structure, governance, composition*, and *purpose*.

Table 2.5: Network Dimensions

Dimension	**Description**
Structure	The set of connections among actors in a network (Russell et al., 2015; Wohlstetter & Lyle, 2019)
Governance	The use of institutions and collaboration structures to allocate resources, coordinate, and control collective action across the network as a whole (Russell et al., 2015).
Composition	The collection of actors within a network and the specific resources they bring to their work (Russell et al., 2015).
Purpose	The substance or mission driving the work of the network (Wohlstetter & Lyle, 2019).

As described by scholars, *network structure* refers to the set of connections among actors in a network (Russell et al., 2015; Wohlstetter & Lyle, 2019). Scholars identify centrality and density as important elements of a network's structure. Centrality refers to the extent to which relations and communication patterns within it are centered around one or only a few prominent actors of subgroups (de Lima, 2010). Networks can range along a spectrum from highly centralized to decentralized. In a centralized network, the connections among actors are mediated by a central agency where centralized actors are key conduits for the exchange of information and the coordination of collective action (Bryk et al., 2011; Huang & Provan, 2007: Russell, et al., 2015). Centralized structures may not only promote system efficiency, coordination, and service integration (Huang & Provan, 2007; Provan & Milward, 1995), but also puts demands on central actors to provide coordination for the network (Russell et al., 2015). Decentralized structures rely more heavily on local actors to establish and maintain system coordination and

integration. Density refers to the proportion of possible connections that exist among actors (Russell et al., 2015). Density can be an indicator of a network's ability to distribute information, trust, and influence among network partners (Huang & Provan, 2007; Yamaguchi, 1994), and to engage members in collaborative work (Goldsmith & Eggers, 2004).

Network governance refers to the use of institutions and collaboration structures to allocate resources, coordinate, and control collective action across the network as a whole (Russell et al., 2015). Network governance is concerned with power structures and decision-making authority within the network and its implications on network operations (de Lima, 2010; Russell et al., 2015; Wohlstetter & Lyle, 2019).

Network composition refers to the collection of actors within a network and the specific resources they bring to their work (Russell et al., 2015). This includes the composite of individual actors or collective actors within the network, for example individuals, schools, or organizations embedded within the network (de Lima, 2010). It also includes the particular skill, knowledge, and expertise members bring to the network.

Network purpose refers to the substance or mission driving the work of the network. Network purpose may vary in scope, ranging from a broad focus on increasing educational opportunities for all students to a narrower focus on improving literacy instruction (Wohlstetter & Lyle, 2019). Network purpose is often informed by the reasons and motivations behind the creation of the network and the core mission and beliefs of the network.

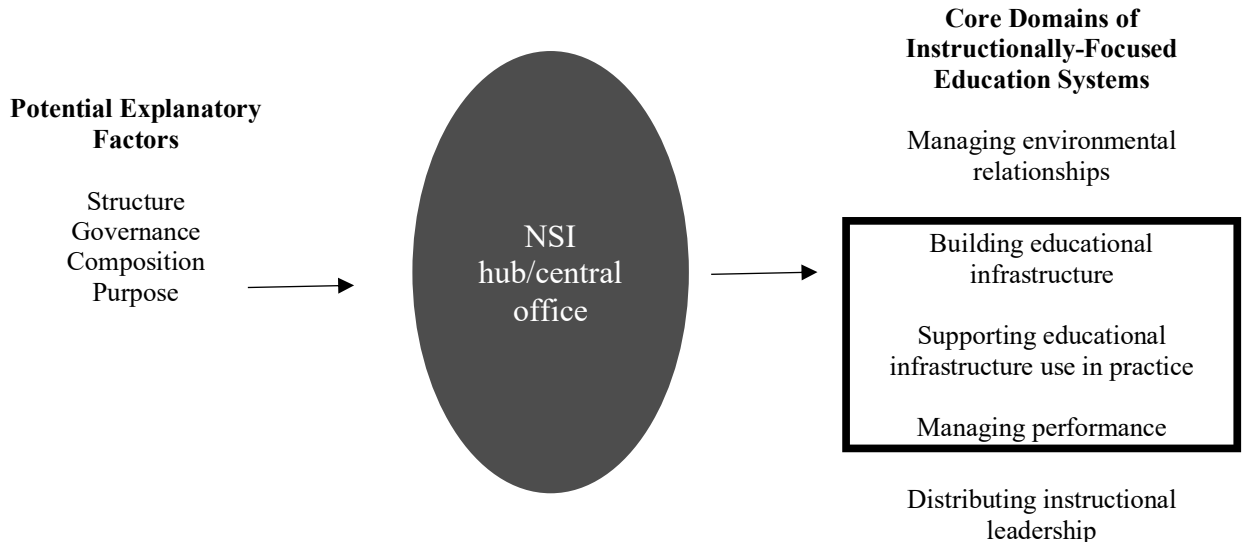
Research Agenda and Analytic Framework

As expressed in this chapter, scholarship around NSI has laid out two dual trajectories for analyzing network improvement efforts: one focused on identifying and understanding NSI core functions and another concerned with building theory to guide research and analysis of networks

themselves. The former trajectory is concerned with more practical implications for understanding the day-to-day work of NSI and the various network models for improvement. The latter is focused on identifying key dimensions of educational networks. The alternative that I take up in this analysis is to explore the possibility of merging these two. My assertion is that, in doing so, advantage lies in understanding how NSI organization shapes its designs for instructional reform.

I bring these two trajectories together by proposing an analytic framework to support reasoning about these matters in relation to each other, not in isolation. This is in the attempt to build rich, nuanced knowledge around particular NSI models for improvement and their use in practice, while also helping to add to the developing theory around how scholars might research and conceptualize educational networks themselves. To guide this work, I use an analytic framework to help merge these two research trajectories.

Figure: 2.1: Analytic Framework



In the analytic framework above, network structure, governance, composition, and purpose serve as potential factors that bear on and help to explain NSI designs for three of the five core domains of functional education systems: building educational infrastructure, supporting educational infrastructure use in practice, and managing performance. While this analytic framework is informed by the literature on NSI and network designs, it is provisional. The next steps are to 1) test the utility of this framework and 2) to gather empirical evidence of how networks organize to support teaching and learning and why networks organize in these ways. Given the analytic framework presented here, I pose two questions to guide analysis in this study:

1. In what ways do networks develop and coordinate designs for (a) building educational infrastructure, (b) supporting the use of educational infrastructure in practice, and (c) managing performance?
2. In what ways are the preceding domains of work shaped and influenced by network structure, governance, composition, and purpose?

Although comparative research on NSI is limited, there are themes running through the existing research from which I can build provisional conjectures around my research questions. One conjecture is that network designs will vary in the level of specificity of their designs, and in the guiding principles characterizing network approaches to instructional improvement (Cohen et al., 2014; Datnow et al., 2005; Glennan et al., 2004; Stringfield et al., 1996; Wohlstetter et al., 2016). Studies of the network-based improvement efforts identify a range of approaches. Scholars have characterized these approaches as (a) those that emphasize control and fidelity and (b) those that prioritize local commitment and adaptation (March, 1991; Rowan, 1990; Supovitz, 2015). Fidelity-based approaches tend to use highly-specified designs that direct teaching and

learning across the network. Adaptive approaches use more loosely-specified designs that facilitate local innovation and design. Others fall somewhere in between. Given this continuum, I expect that the networks studied here will vary in their overarching principles and approaches for instructional improvement.

A second conjecture is that differences in network designs might reflect core distinctions in network type. In particular, designs might vary depending on the market sector in which these networks are located (Wohlstetter et al., 2016) and the broader organizational arrangement of the network itself (de Lima, 2010; Russell et al., 2015; Wohlstetter & Lyle, 2018). Since the two networks studied here represent different network types operating in distinct market sectors, I expect to observe differences in network designs as a result.

A third conjecture is that the networks studied here will likely run up against an array of challenges stemming from both the internal and external environment that complicates network designs. As identified in the research on network-based improvement, internal challenges for large-scale network improvement include building school-level buy-in (Berends, et al., 2002; Glennan et al., 2000) and establishing and sustaining on-site supports (Berends et al., 2002; Glennan et al., 2000; Stringfield et al., 1996; Wohlstetter et al., 2016). Network designs may also be complicated by inflexible school governance structures and pre-existing school cultures (Barletta, 2018). External challenges might include aligning designs with policies and infrastructures in the broader environment (Cohen et al., 2014; Glennan et al., 2000). I expect to find that some combination of internal and external tensions will complicate the networks' designs for instructional improvement.

CHAPTER 3

Methodology

I have addressed the aforementioned research questions through a qualitative, comparative case study design of two NSI focused on instructional improvement. In this chapter, I describe in this order the study's research design, data collection methods, methods of analysis, and study limitations. Very importantly, in the last section of this chapter I preview the key findings of this study and lay out the organization of the following findings chapters.

Research Design

As a qualitative researcher, I seek to understand the world "in terms of people, situations, events and the processes that connect these" (Maxwell, 2012, p. 29). Using qualitative methods in this study supports the development of rich understandings of how two networks approach instructional improvement from the perspectives of those leading and carrying out this work.

A comparative case study design was particularly useful given the purposes of investigating different approaches for building educational infrastructure, supporting infrastructure use in practice, and managing performance. As a research design, comparative case study research enables both within case and across case analyses that supports exploration of multiple contributing factors leading to a given outcome (Moss & Haertle, 2015). Through this comparative design, I was able to develop in-depth understandings of the distinct features

and approaches to instructional improvement of each network, while also comparing across networks to identify and understand similarities and differences across cases.

Study Context

The data for this dissertation comes from a larger Spencer Foundation funded study exploring implementation of the common core standards in NYCDOE. As part of the larger study, we conducted 71 interviews with 60 individuals, including network staff and personnel at the NYCDOE who worked with the networks in our sample. The research team directly observed 27 professional learning events for teachers and leaders totaling more than 100 hours of observation. The research team also collected artifacts of practice, including organizational charts, network plans, curricula, and others. This dissertation draws on the breadth of data from the larger study, but explores two NSI more deeply in this comparative case study. See Appendix B for more information regarding data collected in the broader study.

NYCDOE was chosen as the study context because it works in a standards-and-accountability state and, thus, faces a context pushing it to address instructional improvement. As one of the first adopters of the CCSS in 2010, New York state emerged as a leader in Common Core implementation (Wohlstetter, Buck, Houston, & Smith, 2016). After adoption of the CCSS, New York State Education Department (NYSED) quickly began working on state-wide implementation by developing a range of supports for schools, including instructional resources and curricula, PD, and others, to be used across the state.[14] These open-sourced, free materials

[14] With federal funding under the Race to the Top grant, the NYSED and various partners developed curriculum materials for grades Pre-K to 12 in both Mathematics and English Language Arts (ELA) and provided these materials for free download from the EngageNY website. In 2015, the NYSED added links to Social Studies Inquiries that are also available free to all users. For more information on these resources, see https://www.engageny.org.

are widely accessed by practitioners both inside and outside New York state and provide an important alternative for CCSS implementation support (Haydel & Carmichael, 2015).

Moreover, NYCDOE has the largest and most diverse school system in the United States (Sable, Plotts, & Mitchell, 201-301), serving over 1.1 million students in over 1,800 schools. Its school district is home to a diverse population of students, schools, and educational organizations, making it a rich site for comparing and contrasting various approaches to instructional improvement. The NYCDOE is sub-divided into local districts that operate across the city's five boroughs. Each of these districts is run by a superintendent office responsible for instructional guidance, school support, and school evaluation. Each borough has a Field Support Center (FSC) that provides a range of instructional and PD supports to schools. The city also has more than 200 charter schools that served roughly 95,000 students at the time of this study.[15] Of these charter schools, more than 100 are independent, roughly 100 are affiliated with a CMO, and a few are affiliated with an EMO.

Also operating in the system are external support providers, formally known as affinity partners. Affinity partners are external support organizations that work with groups of schools across a range of curricular, instructional, and other support areas. Affinity partners work alongside NYC public schools and have no formal evaluative relationships with member schools. At the time of this study, five affinity partners exist in the city serving 167 district schools. Tables 3.1 and 3.2 provide information on NYC student demographics and an overview of the system structure.

[15] For more information on charter school demographics in the city see, http://www.nyccharterschools.org/sites/default/files/resources/NYC-Charter-Facts.pdf

Table 3.1: NYC Student Demographics (2016-17)

Subgroup	Asian	Black	Hispanic	Multi-race	White	Students with Disability	English Language Learners	Students of Poverty
% of student population	15.8	26.5	40.4	2.3	14.9	19.4	13.4	75.2

Total Enrollment: 1,141,232

Table 3.2: NYC System Structure (2016-17), Overview

System Structure	Description
Public Schools	~1,800 schools serving over 1,000,000 students -32 districts led by a local superintendent office and supported by a borough field support center
Charter Schools	~ 200 schools serving over 100,000 students ~100 independent charters ~100 CMO-run
Affinity Partners	Serving ~167 NYC public schools -5 affinity partners across the district

Case Selection

This study explores two leading networks in NYC that offer unique designs for instructional support. Apex, a CMO, and Novel, an affinity partner, have distinct organizational structures, beliefs, and intentions that shape their designs for instruction and instructional improvement. In this section, I provide a brief historical overview of each network and an analytic description of each network to better understand the network's structure and configuration. I also provide a rationale for selection for each network.

Apex. Apex began as a single school that opened in the late 1990s with the goal of closing the achievement gap and outperforming conventional public-school districts in student achievement. This flagship school quickly showed significant gains in student achievement

scores and outperformed local district and state averages, often dramatically. Four years later Apex opened as a non-profit CMO to support the founding of additional schools.

Apex was selected as a case because of its demonstrated success in student achievement and its leadership in the charter school market. Apex is considered a leading CMO by *U.S. News and World Report* given its scores on standardized measures of student achievement in core content areas and other measures of effectiveness. Apex schools routinely outperform district and state achievement averages and enroll their students in college at high rates. Studies of teacher impact show a positive influence on student learning in math and reading after three years of enrollment. These effects translate into approximately 0.9 and 0.7 years of additional achievement in math and reading, respectively.[16]

Since the founding of its flagship school, Apex has evolved as a network. By the year of this study, Apex operated over 30 elementary, middle, and high schools located in five cities, a majority of which are located in NYC. [17] Apex has undergone significant expansion over the course of its tenure, growing in both number of students and geographic regions served (Apex Annual Report, 2016).[18] As a network, Apex is intentional and methodical in its plans for scale-up. Apex exclusively founds its own schools (vs. school takeover/turnaround), using a grade-by-grade expansion model to establish new schools. As evidenced in its organizational documents, the network expresses a desired growth rate of three to four new schools per year. It focuses on geographic concentration of schools across the five cities (as opposed to opening schools in new markets), in order to focus its efforts across a geographically smaller, denser network.

[16] I do not directly cite this research here as it will easily disclose the identity of the network.
[17] Apex opened in NYC during a time of rapid charter expansion. During Mayor Bloomberg's three terms in office (2002-13), charter schools expanded by more than 600 percent, a rate six times that of the nation as a whole during the same time span (Eide, 2017).
[18] The network has grown by roughly 13% increase (in total number of students) annually.

Apex's expansion model focuses on a 'home grown' approach as it seeks to staff new schools with leadership cultivated by the network through its leadership development program. Principals and regional superintendents identify teachers with leadership potential and develop development plans to support their movement towards leadership positions. The network analyzes data for future leadership needs and makes strategic decisions about network growth based upon leadership availability. Guiding this cultivation of leaders is a series of explicit tools and practices used to support leadership development at the hub and school level.

Apex organizes its network using a cluster school approach where a cluster of two elementary schools (K-4), two middle schools (5-8), and one high school (9-12) open under a single charter governed by a board of trustees. School clusters enter into a formal charter management agreement with the hub that outlines a set of expressed services provided to member schools (see Table 3.3). In exchange for a service fee, the hub provides a set of critical services related to managing the school, including curriculum development, PD, recruitment of school leaders and teachers, school inspection and evaluation, managing issues of facilities, fundraising, and marketing. Member schools are responsible for the day-to-day school operations.

Table 3.3: Apex Hub Services

Services Provided
Develops core curriculum and supports its implementation in schools
Prepare budgets for Board of Trustee approval
Recruits principals, teachers, and other administrators
Provides initial teacher training and limited ongoing PD
Provides initial training and ongoing coaching and evaluation of principals.
Provides support in finding facilities and coordinating major repairs/renovations.
Facilitates purchasing/procurement of technology
Manages start-up process for new academies
Conducts school inspections and evaluations every 3 years.
Fundraises
Provides marketing and advertising

As part of the competitive charter school market, Apex's legitimacy and sustainability depends upon continued demonstration of high-quality outcomes for its students. Given the network's professed goal of outperforming local districts in student achievement, Apex tracks its overall network performance compared to local district achievement. In most cases, Apex schools outperforms its local counterparts. In NYC, for instance, Apex students' overall proficiency is double that of the host districts, and exceeds city averages by more than 24% points. In math, every Apex school's eighth-grade class performed in the top 3% of all NYC schools (Apex website).

Apex's hub is comprised of approximately 120 staff personnel. Of these 120, approximately 60 (50%) are members of the teaching and learning division. This division is specifically focused on the supporting instruction and instructional improvement in the network.

Since its beginning, Apex has remained committed to a 'No Excuses' approach to schooling. Yet, over time the network has evolved by explicating its resources/design to manage

challenges arising in the network. For instance, as Apex grew the network's leaders found it important to be more explicit about the hub-school relationship.[19] As described in previous research on Apex, over time the hub established more expectations about the balance between school autonomy and network responsibilities. [20] This included developing a set of shared beliefs and practices used across the network to further articulate responsibilities of the hub and responsibilities of member schools. The hub also came to provide more guidance around day-to-day instruction over time, coming in the form of more resources to support and guide the daily work of school leaders and teachers. This includes, for instance, more technical resources for instruction and more/more explicit common practices used across the network.

***Analytic description*.** As a CMO, Apex exists in the charter school market working alongside the public-school district. However, it is not under the direct purview of the NYCDOE. Rather the network's local authorizing agent oversees Apex schools in local areas. Apex's strong network hub has authority over most instructional and operational decision-making in the network as established under the network contract. The hub also serves as the ongoing monitor and evaluator of performance for schools in their network. Although the hub provides some instructional and operational support directly to member schools, regional superintendents serve as the main intermediary for support between the hub and schools.

Apex schools are relatively homogenous in terms of their demographics. With the organizational mission to provide high-quality educational alternatives in traditionally underserved areas, the network locates schools in areas with relatively similar contexts and student demographics --urban areas serving predominantly at-risk and low-income students. As

[19] In order to maintain the anonymity of the network I do not directly cite this previous research here as it will easily disclose the identity of the network.
[20] For more information on local authorizing agents in NYC, see http://www.nyccharterschools.org/resources/list?f%5B0%5D=field_tags%3A205

described by the network, the majority of Apex students are "Black, Latino, and children from low-income families who will be first generation college students" (Apex website). Apex's organizational mission and design promotes a shared identity across the network as network goals, initiatives, and structures are common across Apex schools. As described earlier, Apex is engaged in systematic scale-up of its network within concentrated geographic regions.

Novel. Established as a school reform organization in the late 1980s, Novel's organizational mission is to improve public education in NYC for all students, regardless of race or economic class. At its onset, Novel served as an intermediary for philanthropic dollars between the NYCDOE and schools themselves. Novel's early work involved working with community-based organizations to open small public schools throughout the city that held students to high personal and academic standards. During this work, Novel helped to found over 100 small schools across the city, but did not provide ongoing instructional support to the schools. Over the years, leading foundations such as the Carnegie Corporation of New York, Annenberg Foundation, and Bill and Melinda Gates Foundation funded Novel projects across the city to improve educational opportunities for students.

In 2007, the NYCDOE chose Novel to serve as an external support provider in charge of providing instructional and operational support to a group of district schools across the city. This came as the NYCDOE reorganized its system into CFNs that served as the main source of support for schools (See Chapter Two for more information on CFNs). The NYCDOE chose Novel to serve as a special type of CFN, known as a partnership support organization (PSO), to manage a portfolio of district schools in the city. During this time, Novel not only expanded its curricular and instructional work with schools, but also expanded as an organization more broadly. Novel developed an administrator residency program and began opening several charter

schools in the city. At the same time, the organization continued to receive grants and other funding to support various projects aimed at improving its work as a support organization. In 2014, when the de Blasio administration dismantled the CFNs/PSOs favoring a re-centralization of NYC schools, Novel and several other support networks were allowed to remain working with networks of schools in the city. These networks, now called affinity partners, focus specifically on providing instructional and data support to member schools.

Novel is currently under contract with the NYCDOE to support member schools for a three-year term. The network is paid directly by the NYCDOE for services rendered to schools in its network. Schools opt in to the Novel network for the three-year term and pay no out of pocket fees for their membership to the network. As a term of its contract, the NYCDOE evaluates Novel's performance and reinstates contracts upon expiration. As described on the network website, Novel provides a set of services to member schools as listed in the table below.

Table 3.4: Novel Hub Services

Services Provided
Leadership development and coaching
Data analysis and development of school specific data tools
Practitioner networks
Direct operational support (budgeting, scheduling, programming)
Policy analysis and research capabilities
Technical and Compliance support (preparation for annual NYCDOE School Quality Reviews)
Opportunities to participate in innovation projects

Novel's hub is larger than that of Apex, comprised of approximately 150 staff members. However, approximately 30 of these members (roughly 20% of the hub staff) are on the teaching

and learning team directly focused on instructional support in the network. This is in contrast to Apex's roughly 50% of hub personnel focused directly on teaching and learning.

Similar to Apex, Novel's current design for instructional support reflects an evolution of its design over time. In contrast to Apex, Novel is much newer to the work of instructional improvement. Novel began as a founder of small schools, but it was not until it pivoted to a PSO that Novel became more intimately involved in supporting schools around instruction. In its early work as a PSO, Novel focused on providing direct coaching support to teachers in its network around unit and lesson planning. Over time, the hub modified its approach to focus on establishing full course curricula and resources, and training teachers around using those resources in practice. While Novel originated as an organization nearly ten years before Apex, Novel's focus on providing instructional support to schools is much more recent.

As an external partner working alongside the district, Novel tends to be more sensitive to the local political context than Apex. For instance, in the transition from Mayor Bloomberg to Mayor de Blasio administrations in the city, PSOs were nearly completely eliminated from the current structure. It took much political jockeying by Novel executives to remain a part of the city's support structure as an affinity group (Wall, 2015). There is no certainty that the network's contract with the district will be reauthorized after expiration. Budget constraints, political will, member satisfaction, and a whole host of other forces are likely to determine the fate of Novel as a player in the system. This suggests that Novel needs to be concerned with the satisfaction of its clients, namely its member schools and the NYCDOE more broadly.

Analytic Description. Novel is an external support provider in the non-profit sector working alongside the traditional NYCDOE to support a subset of district schools. Novel has no formal authority over schools in its network. Rather, local superintendents have formal

evaluative and regulatory responsibilities over member schools in Novel's network. Novel has a decentralized organizational structure where the hub directly supports schools with no intermediary management between the hub and member schools. The hub works with local superintendents and borough field support centers to coordinate some of its supports to schools and, at times, responds to requests from superintendents and field support centers to provide particular supports to schools.

Novel works with a heterogeneous set of schools that vary in their individual needs and goals. Novel manages a group of district schools that vary across a range of dimensions, including location, size, socioeconomic status, student achievement, among others. Given that Novel schools are under the formal authority of the NYCDOE and local superintendents, there are also a wide range of different mandates, goals, and initiatives within each member school. Per the NYCDOE contract, Novel is not currently able to scale-up its network in the city.[21]

[21] Although Novel is not able to scale-up their network in NYC, the network is expanding their curricular and instructional supports to other areas of the state.

Table 3.5: Network Descriptions

	Apex	Novel
Network Type	CMO	External Support Provider
Market Sector	Charter	Non-profit
Established	Late 1990s	Late 1980s
Hub Size	~120 total ~ 60 in teaching and learning	~150 total ~30 in teaching and learning
Network Structure	Centralized network working within, but apart from, the NYCDOE	Decentralized, external support network working alongside the NYCDOE. Operates as an intermediary organization between the district and schools.
Network Governance	Strong authority over member schools' instruction and operations as laid out in CMO contract	No formal authority over member schools' instruction and operations
Network Composition	Over 30 schools, "homogeneous" population serving predominately underserved and low socio-economic students. Founds all schools in the network	Over 70 schools, "heterogeneous" population serving schools across a range of demographics. Schools opt-in to the network
Network Purpose	Supporting schools and scaling up network	Supporting schools, no scale-up in NYC

Participants

Study participants included a range of informants at both the hub and school level. Although positions and titles varied across organizations, below is a description of the key participants included in this study. Due to access restrictions set by the networks, this study did not include teacher participants.

Hub leaders. Hub-level leaders are all employed and located at the network hub. Their work involves overall management and direction for the network as a whole. Positions include: network presidents, executive directors and deputy directors, and regional superintendents.

Hub specialists. Hub specialists are employed and located at the network hub, but work more directly with member schools. Their work involves curriculum development, coaching, and school support. Positions include: content directors, hub-level instructional coaches, and assessment specialists.

School leaders. School leaders work exclusively in schools managing and supporting school-based instruction and administration. Positions include: school principals, assistant principals, and academic deans.

Defining the Scope

The focus of this study was (a) to explore network designs for building educational infrastructure, supporting the use of educational infrastructure in practice, and managing performance and (b) to analyze key network dimensions as potential explanatory factors for network designs. Both networks do more work outside of instructional improvement, such as facility management, talent recruitment, data/technical support, and more. Given the focus of this study, it was necessary to delimit the research conducted in these networks. For this reason, I concentrated data collection and analysis on those portions of the network that engaged most centrally in the work of instruction and instructional improvement. I did not explore the aforementioned features given their more tangential influence on instructional improvement.

It is important to note that delimiting the scope of the study in this way boxed out a significant portion of both network's work. For instance, Novel provides schools with a series of data tools to enhance school-level decision-making and strategic management. These data tools

provide accessible and pertinent data, such as attendance, graduation rates, and course credit, among others, that support leaders in systematically engaging with key administrative challenges, such as student scheduling. Although this work is a large focus of the network, I do not present on this work as it is not an explicit part of the network's design for instruction and instructional improvement. Similarly, Apex supports member schools in recruiting school leaders and teachers, managing facilities, and marketing the network, among other responsibilities. However, this study did not explore these features as they were viewed as having less direct influence on the network's design for instruction and instructional improvement.

Data Collection Methods

As described previously, this dissertation was nested in a larger study sponsored by the Spencer Foundation exploring implementation of the common core standards in NYC. In this larger study, we conducted 71 interviews with 60 individuals, including network staff and personnel at the NYCDOE who worked with the networks in our sample. The research team directly observed 27 professional learning events for teachers and leaders totaling more than 100 hours of observation. The research team also collected artifacts of practice, including organizational charts, network plans, curricula, and others. As a member of this research team, the data collection for this dissertation was complemented by the extensive data set collected by the broader study that provided much additional evidence informing my research questions.

In this dissertation, data was collected through multiple methods, including semi-structured interviews, field observations, and documents.[22] I used multiple methods of data collection in order to develop a more robust collection of data points, and to support analytic methods. In particular, multiple methods of data collection allowed for triangulation (Fielding & Fielding,

[22] Although I use to first person to describe data collection methods, in some cases members of the broader research team collected the data.

1986), complementarity (Greene, 2007) and expansion of information (Greene, 2007). Responses to both research questions were constructed using the full complement of the data. Table 3.6 presents the data collection methods for each data source in this dissertation.

Table 3.6: Data Collection Methods

	Apex	**Novel**
Interviews	8 interviews (recorded, transcribed, coded)	14 interviews (recorded, transcribed, coded)
Observations	4 days of PD (~24 hours) (fieldnotes, coded)	3 days of PD (~18 hours) (fieldnotes, coded)
Document review	Strategic plans, organizational charts, contracts, operational protocols and manuals, PD/instructional support schedules and materials, curricula, working documents, website materials, and PD materials. (coded)	Strategic plans, organizational charts, contracts, operational protocols and manuals, PD/instructional support schedules and materials, curricula, working documents, website materials, and PD materials. (coded)

Interviews. The primary source of data for this study was participant interviews. As described by Maxwell (2012), interviews are one of the most important sources of case study evidence. Well-informed participants can provide important insights into the phenomenon under study and can help to identify other relevant sources of evidence. (Maxwell, 2012). My use of interviews achieved that aim. Not only did these interviews provide critical insights into the design, implementation, and performance management of instructional improvement, but participants also identified other valuable sources of evidence to support a well-rounded collection of data.

I completed interviews with key informants at the hub-level and school-level using two types of interviews: in-depth interviews (Yin, 2014) and focused interviews (Merton, Fiske, & Kendall, 1990). In-depth interviews asked respondents about the facts, as well as their opinions about events. Interviews occurred over an extended period of time, not just a single setting (Yin, 2014, p. 107). Focused interviews were shorter in length and questions followed the interview guide more closely (Yin, 2014). Interviews were semi-structured and each lasted approximately 60 minutes in length. Semi-structured interview questions allowed me to 'maintain a balance between a free-flowing and directed conversation" (Lee, 1999, p.62), which supported me in asking essential questions, while also allowing the participant to offer information outside the scope of my questions. Each interview was audio recorded and transcribed. See Appendix C for a sample interview guide.

Observations. Since case study research should take place in the natural setting of the "case" (Yin, 2014, p. 109), I conducted direct observations of PD and training sessions for teachers and school leaders. These direct observations provided first-hand accounts used to complement information gathered through interviews (Merriam, 1988). Direct observations generated illustrative accounts of the phenomenon under study and supported more robust understandings of information gathered through interviews.

I used a formal direct observation protocol for each of these observations. An observational field instrument was completed during PD observations. This instrument captured the activities, conversations, session flow, and environmental descriptions for each session. In addition to capturing the aforementioned elements of the PD, I also noted wonderings and questions that surfaced during these observations; however, these were kept to low inference. See Appendix D for a sample observation field note form.

Document collection. As noted by Merriam (1988), documents are useful data sources given the unobtrusive nature of their collection. Documents exist in the situation and are not dependent upon interpretations of the individual. Document collection was particularly useful in this study as it helped to develop understandings of organizational configurations, processes, and operations that both confirmed and expounded interview and observational data. I collected key documents pertinent to network operations and instructional support to be reviewed. Document collection included: strategic plans, intra-organizational charts, contracts, operational protocols and manuals, PD/instructional support schedules and materials, curricula, working documents, memos, website materials, and PD materials.

Methods of Analysis

Overview

In accordance with the conventions of comparative case study research, I conducted both within case and between case analyses of the data to examine patterns within and across these networks (Yin, 2009). I used an iterative coding process (Corbin & Strauss, 2008) to guide analysis. Using the Dedoose Qualitative Software, I began with focus coding using organizational codes (Maxwell, 2012) based upon the core dimensions of instructionally-focused education systems identified in the research: building educational infrastructure, supporting educational infrastructure use in practice, and managing performance. I then moved to more elaborate coding based upon both substantive and theoretical coding (Maxwell, 2012) to generate a series of sub-codes. I also engaged in frequent descriptive and analytic memo writing (Emerson, Fretz & Shaw, 2011) to summarize preliminary patterns emerging from the data. Table 3.10 presents the coding scheme used in this study. Appendix E displays the frequency of codes for each network across the body of data.

Table 3.7: Coding Scheme

Focus Code	Sub-code	Sub-codes
Educational Infrastructure	Vision of Instruction	
	Formal Resources for Instruction	Instructional guidance PD Coaching
	Social Resources for Instruction	
Supporting Educational Infrastructure Use	Hub-based supports	Teacher supports Leader supports
	School-based supports	Teacher supports Leader supports
	Implementation tools and guidance	
Managing Performance	Monitoring for Accountability	Measures of student achievement Observations of practice
	Monitoring for continuous improvement	Data capture Meaning making Information sharing Embedding learning

Using these codes, I developed an analytic matrix for each research question based upon the iterative coding process used in my analysis. I then constructed a comparative analytic matrix for each core domain that included the codes from each case in order to identify similarities and difference across cases. I used more analytic memo writing to summarize key distinctions and similarities across network designs. Table 3.8 presents a sample comparative matrix used in this study.

Table 3.8: Sample Comparative Matrix, Educational Infrastructure

Focus Code	Sub code	Sample excerpts	
		Apex	Novel
Educational Infrastructure	Vision of Instruction	*"And what we're trying to balance in history at Apex is a commitment to the Common Core shifts towards depth, toward evidence, sound logic, like all of those things are really strongly aligned to the shifts in AP history. But also, to honor and really teach kids disciplinary thinking skills"*	*"So we have been embedded a lot of instructional routines into our curriculum and we've seen a lot of power in that, especially in math and in science. What we found is that the routines help both the teachers and students because they reduce the cognitive load because they know what's going to come next."*
	Formal Resources for Instruction	*"We use something called interim assessments, which occur 4-5 times a year, depending on which level you're at, grade level you're at. In addition to that, in elementary and middle school, we're also using other shared assessments as well--more frequent, shorter shared assessments."*	*"We started with developing a lot of student facing materials, so materials that teachers could give directly to students."*
	Social Resources for Instruction	"We believe in living by our core values. At Achievement First, these values inform and guide us in all aspects of what we do—from the classroom to the Network Support office—and help our mission-driven organization thrive with a positive, achievement- oriented culture"	*"Central to the philosophy is that teachers take what works for them and use it as a tool in their arsenal and that decision is still up to them what they pick and choose. Just like they pick and choose from other resources as well."*

I then coded the analytic and comparative matrices and memos with the core network dimensions explored here (network governance, structure, composition, and purpose) to identify possible explanations for network designs. When a network dimension surfaced as a potential explanatory factor for a network design feature, I went back to the data to confirm or disconfirm that as a potential rationale for network design. Table 3.9 provides an example of the process I used.

Table 3.9: Process for Identifying Potential Explanatory Dimensions

Code	Excerpt	Potential Explanatory Dimension	Confirmatory Evidence
Building Educational Infrastructure	*Central to the philosophy is that teachers take what works for them and use it as a tool in their arsenal and that decision is still up to them what they pick and choose. Just like they pick and choose from other resources as well.*	Composition	*I would emphasize again that we think that the curriculum needs to be flexible enough so that teachers can modify it for their students and for their students' needs, and the resources they have available in their school. We have a lot of teachers who have no technology in their school and teachers who have one-to-one laptops and students. Some schools with mainly ELL, and some schools in suburban areas with extremely high achieving students who are trying to catapult into AP, and we've, so far, people have been saying, that the resources have been used in all of those contexts, but they're only able to be used if they're easily modified for whatever the context happens to be.*

Validation

I used several techniques to evaluate the validity of interpretations and conclusions made in this study. One, I analyzed the data using iterative cycles. During these cycles, I moved between "inductive data collection and analysis and deductive cycles of testing and analysis." (Miles & Huberman, 1994, p. 438) This allowed me to identify missing information and ensure that I provided warrants for any assertions made. Two, I triangulated across a variety of evidence (Huberman & Miles, 1994) to identify and refine constructs. Three, I engaged in auditing (tracing analysis from data sources through to conclusions) in order to ensure that my findings were grounded in the data, and inferences were logical given the data at hand (Huberman & Miles, 1994). Along with this, I searched for negative or deviant cases that did not support or contradicted patterns from data analysis (Patton, 2001) to help me in revising, broadening, and confirming patterns. Four, I used informal and formal member checking to give participants the opportunity to correct errors with preliminary interpretations (Creswell, 1998). Finally, I used

illustrative instances in order to support the interpretations and conclusions drawn. Erickson (1989) describes illustrative instances as particular descriptions, quotes from field notes and interviews, and narrative vignettes (p. 149). I used these illustrative accounts in the reporting of my conclusions in order to be explicit about the claims made.

Moreover, I benefited from conducting this study within a larger research project. In particular, access to this broad data set allowed me to make thoughtful choices around case selection. It also allowed me to test preliminary findings across a range of data sources and cases, which provided opportunity for further validation of claims made. Working collaboratively within the research group also created opportunities for critical feedback from team members regarding study design, analytic methods, and findings.

Limitations

Although great care was given in the design of this study, I identify two key limitations to this work: (1) limited school-level data, and (2) uneven distribution of data collection. I briefly describe the limitations of this study in this section.

Due to access restrictions, I was unable to gather teacher-level interviews, observations of school-based (as opposed to hub-based) PD and coaching sessions, and observations of teacher practice in each network. Instead, I relied on interview data and organizational documents to collect data around these features of the networks' design. However, this put limits on what I was able to see in each network. I was unable to gather teacher voices around the network designs for instruction and instructional improvement—a key piece of the story. I was also unable to directly observe how the network designs lived in teachers' and leaders' practical application of them. I see this as a significant and important gap in this research as it emphasizes networks' espoused theories and minimizes networks' theories in use. Further attention to the practical use of

network designs at the classroom level could provide additional insight into the relationship between designs for instruction and instructional improvement and school-level practice. I highly encourage future research in this area to focus attention on school-level implementation of network designs for instructional improvement.

Another limitation of this study was the uneven distribution of data collection across cases. One area of uneven distribution was in the number of interviews conducted at each network. Given that Novel is a larger network than Apex, and curriculum and instruction work is spread across a larger population of informants, it was necessary to interview more individuals at the hub-level to develop understandings of the network's design and operations. Another area of uneven distribution was in the number of observation hours for each network. Apex organizes its PD for all content areas during the same time block, which allowed me to concentrate observations during visits. Novel organizes its PD by content area with sessions taking place more intermittently. As a result, PD observation was more limited for Novel. To mitigate the impact of uneven distribution of data collection across cases, I conducted more document collection to learn about PD and coaching sessions. I also relied on the triangulation of other data sources and additional follow-up interviews to fill gaps when they arose.

Preview of Findings

My key finding in this study is that network dimensions- structure, governance, composition, and purpose- shape the ways in which Apex and Novel developed and coordinated designs for building educational infrastructure, supporting the use of educational infrastructure in practice, and managing performance. It did so by 1) shaping each network's vision for high-quality instruction, and 2) informing a set of design principles for how to pursue that vision. While each network established similar visions for high-quality instruction, the cases differed

along a key dimension not featured in my a priori theorizing: the notion of core "design principles". By that, I mean the overarching values guiding the networks' designs for instruction and instructional improvement. Apex's design had a design principle of fidelity driving its approach. The network's strong center served to establish, direct, and manage a set of practices and procedures aimed at coordinating and improving instruction across the network. Novel's design, on the other hand, used a more adaptive approach to instruction and instructional improvement. The network imagined itself as a center with less direct leverage over instructional decision-making. It provided guidance and resources to schools and aimed to support and develop teachers and school leaders in their own instructional decision-making.

As such, this study examines interdependencies among (a) the network dimensions described above, (b) the overarching design principles that drove their work, and (c) their efforts to build infrastructure, support use, and manage performance. In each of the following three chapters, I present my findings by walking readers through these accounts. I begin by presenting each network's design for the core domains of activity (building educational infrastructure, supporting educational infrastructure use in practice, and managing performance). I present network designs for the core domains of activity first in order to establish the substance of Apex's and Novel's work. I then describe the role of network dimensions in shaping network designs for the core domains. Throughout my analysis, I talk about the role of fidelity and adaptation as overarching design principles in each network.

CHAPTER 4

Findings: Building Educational Infrastructure

In this first finding chapter, I examine network designs for building educational infrastructure, and I explore how network structure, governance, composition, and purpose shape and influence network designs. I do this in three steps. I begin by describing each network's design for educational infrastructure. I then compare network designs to identify key points of similarity and difference between designs. Finally, I analyze how network structure, governance, composition, and purpose, help to explain major distinctions in network designs.

In analyzing the designs for infrastructure, the key point of differentiation lies in the relationship between (a) the specificity of the designs and (b) different emphases on fidelity vs. adaptation in implementing those designs. Where Apex features a highly-specified design with an emphasis on fidelity, Novel features a comparatively loose design with an emphasis on local adaptation. In the case of Apex, this particular combination appears to be shaped by the network's centralized structure, governance over instructional decision-making, homogenous network composition, and focus on network-wide scale-up. By contrast, for Novel, this particular combination appears to be shaped by the network's decentralized structure, limited governance over instructional decision-making, heterogenous network composition, and focus on building a system of supports.

The preceding, in turns, suggests three key points for consideration in network designs for educational infrastructure: 1) one such point involves the relationship between designs for infrastructure and visions for instruction; 2) another point involves the relationship between increasing maturation of the networks and their guidance for instruction; and 3) a final point involves the relationship between the networks' designs for educational infrastructure and their overarching design principles.

The Case of Apex

Apex's design for educational infrastructure includes a set of highly-specified resources that establish explicit and actionable guidance for practice. These resources include: visions of instruction, formal resources for instruction, and social resources for instruction. Apex's highly-specified resources and clear expectations for resource use in practice represents an overarching fidelity-based approach to instruction and instructional improvement.

Vision of Instruction

Apex uses an explicit, discipline-specific vision for instruction to describe the network's high-level goals for instruction in the high school history content area (see Table 4.1). Through this vision of instruction, the hub establishes a normative conception of what high-quality teaching and learning looks like in the content area. This vision of instruction is discipline-specific and includes a collection of rich, content-based approaches to instruction.

For example, Apex's vision for instruction in history emphasizes skills and methods such as building conceptual understandings, disciplinary literacy, and historical inquiry, among others. This vision for history instruction reflects leading research on teaching and learning in this

content area. [23] In fact, each of the hub content area specialists interviewed cited leading research in their descriptions of the content-based visions of instruction. For instance, one content area specialist in history said the following: *"Common Core is happening at the same time as major pedagogical shifts in history--I'm referring to the work of Sam Weinberg and others on historical thinking and historical reading"*.[24] This discipline-specific, content-based vision of instruction is in contrast to other networks that organize instruction and instructional improvement without a clear vision of instruction, or where instruction is organized around a set of more generic, non-discipline specific instructional practices. As described by one hub content area specialist, the focus on disciplinary skills in history helps to support rigorous instruction and meet the intention of the CCSS.

> *[…] the disciplinary skill is where the rigor is. What we're trying to balance in history is a commitment to the Common Core shifts towards depth, toward evidence, sound logic. But also, to honor and really teach kids disciplinary thinking skills.*

Table 4.1 identifies the core components of the network's vision of history instruction as expressed in organizational documents.

Table 4.1: Apex's Vision of History Instruction

Components
Cultivating conceptual understandings and building essential content knowledge
Supporting college-ready literacy proficiency
Developing historical thinking skills through inquiry-based instruction
Developing in scholars a critical lens, a firm sense of self, and a desire to act

[23] See the following select citations for more information on leading research in history and social sciences pedagogy: for building conceptual understandings see (Lee, 2005); for disciplinary literacy (Bain, 2009; Wineburg, 1991); for inquiry-based instruction see (Bain, 2005; Caron, 2005; National Council for the Social Studies, 2014).
[24] The National Council for Social Studies developed national standards for social studies education that are different than the Common Core standards. For more information on these standards see https://www.socialstudies.org/standards

Formal Instructional Resources

Beginning in the 2016-2017 school year, Apex began elaborating its formal instructional resources to include more (and more explicit) curricular resources to support classroom instruction. Apex's curriculum previously included formal resources, such as scopes and sequences and model lesson plans, but did not include resources to direct daily instruction. As described by network leaders, more experienced teachers were able to use the existing materials to develop high-quality lesson plans, but less experienced teachers needed additional support in translating curricular materials into lessons that reflected the network's vision of instruction.

The expanding network saw a need to create more consistency in instruction across schools and classrooms as a way to reduce variability of results. As described by one hub leader, *"the goal was to develop lesson resources as a way to create a more consistent bar around what is safe, rigorous instruction on a daily basis"*. At the same time, teachers were requesting more technical resources to support instruction. As described by one hub leader,

> *Part of that too is it came from teachers saying, look, we're all working so hard, and we're having such a variety of results with our kids. Why aren't we trying to anchor around the strongest resources we have to ensure kids in every classroom are getting strong, rigorous instruction?*

In response to the perceived need, the hub invested in establishing highly-specified daily lessons and corresponding resources to guide classroom instruction.

Apex's formal resources include a set of instructional guidance materials used to direct and support classroom-level practice. These materials provide detailed guidance for enacting day- to-day work, complemented by sources that provide background knowledge and explain underlying rationales. Apex's formal resources for instruction include: curricular resources, instructional models, and assessments. Together, these formal resources establish a distinct Apex

approach to instruction and instructional improvement, and provide actionable guidance to support classroom-level practice around the network's instructional vision.

Curricular resources. Apex's hub establishes a set of curricular resources to direct instruction at the course, unit, and lesson level. These resources provide highly-specified guidance for day-to-day classroom practice that supports teachers in actualizing the hub-established vision of instruction. Apex's curricular resources include: full scopes and sequences, daily lesson resources, and other supplemental instructional resources that support classroom-level instruction. Table 4.2 summarizes the key features of Apex's curriculum.

Table 4.2: Apex Curriculum Features

Curriculum Features	Description
Scope and Sequence	Provides the scope and sequence of the unit, including unit name, unit duration, and standards and learning goals addressed.
Daily Lesson Resources	Includes lesson-level instructional resources, lesson sequencing, lesson scripts, and formative assessments.
Supplemental Resources	Includes additional guidance for students and teachers to help enact particular instructional activities

Hub-developed scopes and sequences provide a detailed structure and pace for the content taught in each history course. As evidenced in Figure 4.1, Apex's history scopes and sequences identify instructional foci with a specified breakdown of when and for how long content will be addressed. Teachers are expected to follow the hub-developed scopes and sequences with fidelity. As I will discuss in later chapters, ongoing monitoring of performance holds teachers accountable for following the pace established by the scopes and sequences.

Figure 4.1: Apex World History Scope and Sequence, Sample

Unit/ IA Cycle	Week of	Weeks of the Year	Inst. Days	Instructional Focus (approximate, based on 1718 curriculum map; expect modest revision in 1819)
1: Neolithic Revolution and Early Civilizations (APWH Key Concept 1)	8/20	Week 1	5	Big Geography
	8/27	Week 2	5	Early humans and agriculture
	9/3	Week 3	4	Pastoralism, Unit 1A test
	9/10	Week 4	5	Ancient Mesopotamia
	9/17	Week 5	5	Ancient Egypt
	9/24	Week 6	5	Ancient China and Indus River Valley
	10/1	Week 7	5	Ancient Mayan civilization and review/skill practice
	10/8	Week 8 (IA1)	1	Review/skill practice

To further support teachers in actualizing Apex's vision of instruction, the hub developed daily lesson resources to provide highly-specified and actionable guidance for daily instruction. Apex's daily lesson resources provide substantial guidance to direct classroom-level instruction by including a range of technical resources to teachers that align with the network's vision of instruction. As described above, Apex recently included these resources as part of the network's instructional design in response to the perceived need identified by the hub and from requests from teachers. These resources include: lesson learning objectives, lesson sequencing, instructional resources--such as texts and handouts, semi-structured lesson scripts-- and formative assessments.

Daily lesson resources are intended to help teachers enact the type of instruction expressed in Apex's visions of instruction through detailed guidance. In particular, these resources helped the network to better support teachers in the shift to more ambitious teaching required by the CCSS. Several network leaders identified the shift to the CCSS as a motivation for establishing daily lesson resources. One network leader describes:

> *I think one of the biggest take-aways we've had as we start thinking about shifting to Common Core is that getting the rigor is incredibly important […]. I think with the daily lesson level resources it allowed us to really go to that next level in terms of what teacher preparation can look like.*

Others in the network saw the daily lesson resources as a solution to a set of challenges given the composition of the network. As described by several hub leaders, the use of highly-specified resources helped to uphold what Apex sees as rigorous instruction across the network. One hub content specialist explains one reason for why the network moved to establishing more formal resources for instruction:

> *The reality of our organization is we have a lot of educators who are new to the profession and we have students who typically are behind their peers and more disadvantaged generally. There is too much at stake to take the time that's needed to really ramp up a teacher's planning skills.*

Figure 4.2 provides an excerpt from Apex's history daily lesson resources. A full sample of a daily lesson resource is provided in Appendix F.

Figure 4.2: Apex Daily Lesson Resource, History Excerpt

Time Stamps	Framing the Inquiry	Contextualizing the Inquiry / Empowering Content	Close-reading		Synthetic Writing with Rapid Feedback / Revision
			30 min		
			Student Investigation	Discussion	
	3 min	7 min	20 min	10 min	10 min

Lesson Plan	Timestamp	What Happens:	
		Outline procedure, <u>including scripted scholar directions, prompts, and key points</u>.	**Plan for mastery.**
	10 min **Prepare scholars for inquiry with:** • **Framing** • **Empowering context** (These can occur in either order.)	**Note**: This lesson is purposefully does not have a comparative level to it (i.e. CCOT, comparison, weighing the significance of the impacts) so that scholars are able to build a solid understanding of 1) the concept of the Columbian Exchange, and 2) what an impact in relation to the Columbian Exchange is. Aim 4, the LEQ Columbian Exchange aim, is focused on comparative writing about the Columbian Exchange that requires scholars to have a strong conceptual understanding in order to engage more deeply in <u>writing</u> skill building. <u>Do</u> Now: *4 mins IP (ATP and MC) + 2 mins debrief* 1. What was the Columbian Exchange? (circle all answers that apply) a. an established trade route **b. the exchange of crops, animals, and disease between the Western and Eastern Hemispheres** c. a process limited to the Americas and Europe **d. a term created by a 20th century historian, not one used by people in the Early Modern Era** 2. What regions were impacted by the Columbian Exchange? (Americas, Africa, Asia, Europe) **Execution Note:** During the Do Now, the teacher should circulate to mine for misconceptions targeted by Questions 1 and 2: - In MC question #1, if scholars are choosing 'A' prioritize question #1 in the debrief. Scholars need to understand that the Columbian Exchange was not a planned trade route but rather a name historians use to describe the overall pattern of exchange between the hemispheres. - Look for the misconception in Question #2 that the Americas and Europe were ONLY impacted. In reviewing question 2, use the image from homework to call out the arrows that name Afro-Eurasia and NOT just Europe as part of the exchange. Scholars need to understand that multiple regions were impacted so they can better analyze the documents. Name for scholars that even though Europeans were the primary group directly interacting with the Americas – and later Africans through slavery, the crops/animals/diseases that were ones that had been shared in Afro-Eurasian exchange networks and *continued* to be shared after the Eastern-Western Hemisphere connection.	**Content to Stamp:** a. The Columbian Exchange WAS NOT a trade route, but instead a process that historians named of the exchange of crops/animals/disease between the Americas and Afro-Eurasia. **Execution Note:** The tendency is to refer to crops/animals/diseases with the origin point in the Eastern Hemisphere as 'European.' To de-

The hub mandates that teachers across the network use these curricular resources explicitly during daily instruction with little deviation from the provided resources. As I will discuss in later chapters, the hub holds teachers accountable for curricular resource use through ongoing monitoring of practice. [25]

The hub also provides a range of supplemental instructional materials to support teachers in using the daily lesson resources. These supplemental instructional materials include additional guidance for students and teachers to help enact particular instructional activities. For instance, Apex's history materials provide additional guidance for establishing norms around classroom discussions that teachers can use with students during instruction. Figure 4.3 provides an example of this type of supplemental instructional material.

Figure 4.3: Apex Supplemental Instructional Material, Sample

Classroom Norms
· Speak loudly and track the speaker · When speaking, make eye contact with the group and not the teacher · Call on each other · Cede the floor – call on students who have not spoken yet · Refer to the documents/text in your comments

What	How (for all seminar participants, including scholars and teachers)
Evidence	· How does the evidence support that idea? · Can you point to a specific document/part of the text/fact to support that idea?
Revoice	· So what I am hearing you say is… · I agree that…and want to add… · I hear your argument that…but…
Clarify	· Can you clarify your idea? · I'm confused. Can you say more about that?
Challenge	· I understood that document/text differently. … · Is there other evidence that challenges/corroborates that? · One assumption we seem to be operating on is… · I want to offer a counterpoint….
Synthesize	· What ideas have we established? · A key take-away is… · We're in agreement about… Can we examine…? · We seem to have a debate between these two points…
Question or Redirect	· I don't know what to make of… · This document raises a question for me…/makes me wonder… · This evidence is confusing in light of the other evidence because… · One question I have now is…
Refocus	• So what do you think now (about the CHQ)? • What do the docs/authors agree on? To drive a question or wondering back to the CHQ: • Why do you want to know that? Why do you care? • Can anyone answer/respond to that? What do you all think?

[25] In select instances, high performing teachers who consistently receive high quality rankings on observations are not required to use Apex's daily lesson resources. The network refers to this as 'earned autonomy'. However, interviews with school principals indicate that many of these teachers still choose to use the curriculum resources.

Instructional models. Apex provides a set of highly-specified instructional models used to illustrate its vision for instruction. One such model, called fundamentals of instruction, is a sample lesson plan articulating the components of an ideal Apex lesson. This lesson plan identifies and describes the core phases of an Apex lesson, provides time stamps for each phase, and presents markers of excellence for high-quality enactment of the lesson. Figure 4.4 provides an excerpt from one of Apex's history fundamentals of instruction used to support teachers in enacting inquiry-based lessons. See Appendix G for a full sample fundamental of instruction

Embedded within these instructional models are video exemplars showing high-performing Apex teachers enacting an Apex lesson. The network uses these models in PD and coaching sessions as examples of high-quality practice, and as a means of norming teachers to Apex's vision of instruction. As described by one hub leader, *"Because we're providing such detailed, daily level supports, teachers aren't doing a ton of their own planning. They're able to lay the plans upon that fundamental of instruction and be able to execute it that way"*.

Figure 4.4: Apex History Fundamental of Instruction, Excerpt

5-12 History: Fundamentals of Instruction				**Inquiry-Based Lesson: CLOSE-READING**
Purpose	**Employ close-reading of a rich text in order to demonstrate deep understanding of a text's core meaning.** **Students deepen understanding through multiple reads, discourse, and writing.** *Close-reading in history is in service of building strong historical reading skills, developing deep understanding of substantive historical concepts, and practicing articulating core idea of historical text.*			
Must Haves	INVESTMENT: Teacher passion for text / close reading is front-and-center. Framing purposes the inquiry in a way that resonates with scholars and connects to broader learning. RIGOR of CONTENT / TASK: The central question is higher order, engaging, and connected to the central idea of the text. The text dependent questions and culminating questions are thoughtful, deliberate, and drive past a surface analysis and toward deepest meaning. THINKING: Scholars spend ≥ 75% of the lesson in reading, discussion, and writing. Facilitation of close-reading or discussion (questioning and scholar tasks) effectively deepens scholar understanding. FEEDBACK: There are clearly established and consistently maintained standards for oral and written scholar work FOCUS: Lesson execution models strong MVP, positive narration, and 100%.			
Time Stamps	**Framing the Inquiry**	**Contextualizing the Inquiry / Empowering Content**	**Close-reading Heavy-lifting Loops**	**Synthetic Writing with Rapid Feedback / Revision**
	3 min	7 min	30 min	10 min
Why	**How Long**	**What Happens**		**Markers of Excellence**
Framing the Inquiry: Build strong investment in the day's lesson. Connect the lesson to the broader learning.	3 min **Note:** This can come before or after empowering context.	○ T frames the inquiry of the day, clarifying the significance of the question to historical understanding ○ T connects the inquiry to broader concepts taught in the course		**Efficient:** Takes less than 3 minutes. **Purposeful:** Teacher connects the lesson to broader historical study/concept/process **Builds Investment:** Teacher has enthusiasm and introduces the question in a way that makes it relevant, contentious, and/or consequential, such that scholars exhibit interest and excitement.
Contextualizing the Inquiry / Empowering Content: Effectively and efficiently prepare scholars for inquiry.	7 min	○ T uses read-to-learn, college lecture, HW review, or another means of highly targeted direct content instruction ○ T uses attribution to prompt analysis of historical context, intended audience, point of view and purpose ○ T employs a quick, high impact check for understanding ○ S uses established method to record notes in a notebook or handout		**Strategic:** Explicitly teaches key vocab or other concepts and/or builds schema (via maps, timelines, and other graphic organizers) that will enable scholars to engage in the inquiry. **Sticky:** Makes abstract concepts concrete, vivid, such that scholars can explain them. **Limited:** Takes less than 7 minutes, does not give too much away or extend far beyond the scope of the inquiry. **Rigor:** Requires 100% minds on, demands that scholars do the heavy lifting with the highest ratio method (usually read-to-learn over direct instruction). **Effective:** Effectively checks mastery of key empowering points before moving on.
Close-Reading Heavy-lifting Loops 30 min		Teacher ○ Facilitates multiple reads structured in heavy-lifting loops, typically: ○ Literal/accurate read: 5-10 min ○ Focus on craft: 10-15 min ○ Deep, core meaning: 10-15 min		**Clear and Rigorous Expectations:** ○ Provides clear tasks or questions to direct each heavy-lifting loop. ○ Tasks/questions are grounded in the central idea and/or rhetorical features of a ½ - 2 page text ○ Proceeds from a briefer literal read aimed at
Loop #1 - Accurate Literal Read: Scholars read to gain an accurate	5-10 min *Text complexity*			

Assessments. A final component of Apex's formal instructional resources includes a set of formative and summative assessments used to gauge student learning on key instructional goals. Within Apex's curricular resources are a series of lesson-level formative assessments embedded in the daily lesson resources. Students are assessed weekly on learning goals through common, network-wide end-of-week quizzes, and through network-wide interim assessments given roughly every six weeks. All assessments are aligned to the network's vision of instruction, scopes and sequences, and daily lesson resources. As described by content leaders across the network, these assessments have been aligned to the common core standards for the past five years. Every teacher in the network is expected to give these assessments.

As described by four hub leaders, these common assessments assist teachers, leaders, and hub staff to monitor student performance across the network. It also helps network members to improve instruction. One hub leader explains, *"the theory here is that frequent and rapid feedback and response to what we're seeing in student work is what's going to drive change."* I will explain how the network uses these assessments to monitor progress and improve practice in more detail in Chapter 6. Figures 4.5 shows an example of a lesson-level formative assessments embedded within the network's daily lesson resources.

Figure 4.5: Apex History Formative Assessment, Sample

Scholar Learning Outcomes	**Aim**	How did the Columbian Exchange impact the world?
	Exit Ticket Task	a. Explain one effect of the Columbian Exchange on the Americas. b. Explain one effect of the Columbian Exchange on Afro-Eurasia.
	Exemplar Response	a. One effect of the Columbian Exchange on the Americas was the decline in the Native American population. Native Americans were exposed to diseases like small pox and measles as a result of interaction with Europeans. Because Native Americans did not have immunities to these Afro-Eurasian diseases, it led to a massive numbers of deaths in their population. This caused an overall decline in population. b. One effect of the Columbian Exchange on Afro-Eurasia was the increase in population as a result of increased calories from new foods. Interactions with Native Americans led to the transfer of crops like corn and potatoes to Afro-Eurasia. In China, farming of sweet potatoes helped provide food for the poor and therefore support a potentially starving population. Overall this increased availability for food led to an increase in population.

Social Instructional Resources

In addition to providing highly-specified instructional visions and formal resources, the hub also establishes a social infrastructure to support instruction. This includes a set of specified resources aimed at organizing, cultivating, and recreating a set of base-level understandings, norms, values, and relationships around instruction within individuals in the network. These resources include, 1) a codified set of core values that drives the network, and a means of cultivating these among network members, 2) a set of articulated responsibilities for the hub and schools as a mechanism for developing initial shared commitment, and 3) a series of common practices used across the network to help organize the relationship between the hub and member schools as a mechanism for maintaining shared commitment.

Apex's codified set of core values aims to establish certain guiding principles driving the network (see Table 4.3). As described in organizational documents, the hub communicates these core values to members through organizational onboarding trainings, routines, PD, rituals and other mechanisms for developing these in and among network members.

Table 4.3: Apex's Expressed Core Values

Core Values
Results without excuses or shortcuts
People matter-mightily
Excellence is a habit
Sweat the small stuff
Team and family
First things first
Whatever it takes
Many minds-one mission
Everything with integrity

To support actualizing Apex's expressed core values in practice, the network first establishes an initial shared commitment by articulating a set of responsibilities and division of labor between the hub and schools. This is established through a management contract schools enter into with the hub when joining the network. Figure 4.6 presents the articulated responsibilities of the hub as outlined in this contract. This contract represents an initial agreement between the hub and member schools regarding their relationship around instruction. It reflects an initial buy-in to the network's approach to instruction and instructional improvement, and establishes initial norms and values for working within the network.

Figure 4.6: Instructional Responsibilities of the Hub, contract

Hub Responsibilities

Develops core curriculum and support school implementation of said curriculum

Recruits principals, teachers and other administrators

- Hub nominates candidates to the Board for new principal hires
- Hub provides initial screening of teacher candidates to principals
- Hub maintains applicant pool
- Principals have final authority in hiring/dismissals
- Hub helps to identify and develop future leaders from within the network

Provides initial teacher training and limited ongoing PD

- Hub provides roughly 2 weeks of initial teacher training
- Hub assists school leaders in developing capacity to deliver ongoing PD and training
- Hub sponsors (2) network-wide PD days annually

Provides initial training and ongoing coaching and evaluation of principals.

- Hub conducts monthly school visits to observe and coach principals.

Apex uses a series of common practices across the network to help further organize the relationship between the hub and member schools around instruction. In carrying out these common practices, the network cultivates and recreates a set of social norms, values, and understandings across the network by maintaining shared commitment around Apex's set of core values. These common practices help to further delineate responsibilities of the hub and member schools. It also establishes how the hub and schools will work together in pursuit of the core values. Figure 4.7 presents these common practices used across Apex schools.

Figure 4.7: Apex School-level Common Practices

Common Practices	
Goals/Outcomes	Evaluated by hub-developed report card Give hub-developed surveys during specific timeframes Work monthly with hub on special education report cards Receives monthly report of network-wide and school-specific key indicators
School Support	Complete comprehensive school review process
Talent Management	Follow hub-developed recruitment process Performance Improvement Plans follow hub-developed format Use hub-developed measures of teacher quality
Teacher and Staff Development	Use of professional growth plans Use of Teacher Career Pathways program and criteria

Through this specified social infrastructure, Apex aims to stitch these particular norms, values, and understandings around instruction and instructional improvement into the social fabric of the network. Apex does so by establishing a set of core values and cultivating and recreating those values through codified practices. As a result, Apex builds commitment for a distinct network culture based upon certain ways of doing and thinking across the network. This established network-wide culture helps to support the work of instruction and instructional reform by minimizing uncertainty around core aspects of their design.

Fidelity-based Design Principle

Apex's design for educational infrastructure underscores an overarching fidelity-based approach to instruction and instructional improvement. Apex's fidelity-based design principle can be viewed as a function of two key components of the Apex's educational infrastructure: 1) Apex's set of highly-specified resources that provide explicit and actionable support for instruction and 2) Apex's clear expectations for resource use in practice.

As described above, Apex's design for educational infrastructure includes a set of highly-specified resources that provide detailed guidance for enacting day-to-day work. This includes formal resources to direct the technical work of instruction, as well as social resources to cultivate common norms, values, and understandings for instruction. For instance, Apex's curricular resources includes explicit and actionable guidance for classroom-level practice. This is exemplified through Apex's descriptive lesson sequencing, pacing, and scripting in the daily lesson resources, and through written and video models of instruction. Through the detail and specificity of these curricular resources, the hub directs classroom-level instruction in explicit ways, leaving little instructional decision-making to teachers. Moreover, Apex's social infrastructure establishes explicit and actionable practices that help to cultivate a set of norms and values around instruction. These include hub established practices for core components of instruction, such as school support for instruction and teacher development, among others.

Mandated use of the hub-developed resources ensures that network members enact the network's educational infrastructure with fidelity. As described above, the hub mandates teachers use the hub-developed formal instructional resources in practice with little deviation. Apex's social infrastructure establishes, cultivates, and recreates a set of norms within the network that reinforces the relationship between the hub and member schools around instruction. This is a relationship where the hub functions as the instructional decision-maker and member schools function as implementors of the instructional design.

The Case of Novel

Novel has a comparatively loose design for educational infrastructure comprised of less specified visions of instruction, formal resources for instruction, and social resources for instruction. This design for educational infrastructure represents a more adaptive approach to

instruction and instructional improvement that focuses on providing a range of formal instructional resources and supporting teachers in using those resources to design their own instruction.

Vision of Instruction

Similar to Apex, Novel organizes its vision of instruction for high school history around a set of discipline-specific approaches to instruction. This vision presents a hub-developed normative conception of high-quality teaching and learning for the network, and sets broad goals for content-based instruction. For example, in Novel's introductory resources to its history curricula the network describes a set of core intentions for instruction:

> *Through the investigation and analysis of primary and secondary sources, students have the opportunity to think critically, and to read, write and speak like historians, while simultaneously honing the literacy and critical thinking skills necessary for both the New York State Regents exams and post-secondary coursework.*

Like Apex, Novel's vision for instruction reflects leading research on content-specific pedagogy. This discipline-specific, content-based vision of instruction is in contrast to other networks that lack visions of instruction, or where visions of instruction reflect a set of more generic, non-discipline specific instructional practices. Discipline-specific visions of instruction offer a more specified approach to establishing high-level goals for teaching and learning. Similar to Apex, Novel coordinates this vision of instruction with other elements of its educational infrastructure, particularly its formal resources for instruction. I take up this point in more detail in the following section.

Formal Instructional Resources

Similar to Apex, Novel recently made an organizational shift towards developing more formal resources for instruction in its network. This includes establishing full curriculum materials to support instruction. As explained by one hub leader, "*you're limited to what you can*

do if you're content-neutral in working with subject-area teachers". Prior to the development of this curricula, Novel directly supported teachers in crafting their own curricular resources through PD and coaching. Novel found this approach did not result in improvement at scale for the network for several reasons. One, teachers needed substantial support in aligning their instruction with the CCSS. With few common core-aligned resources available, teachers often attempted to develop these resources themselves, which proved to be both labor intensive and cognitively demanding work. Two, high teacher turnover in Novel schools meant any investment in individual teacher capacity left the network once the teacher left. Three, the time and money spent supporting teachers through direct and tailored PD and coaching was not feasible or sustainable for the network. Novel saw hub-developed curricula as a solution to these challenges.

Novel now provides a detailed set of formal resources for instruction used to guide (but not direct) classroom-level practice across the network. Comparatively less specified than that of Apex, Novel's guidance supports teachers in designing their own day-to-day instructional work, with a focus on providing a range of instructional resources to support teachers in instructional design. Apex's formal instructional resources include: curricular resources, instructional models, and assessments.

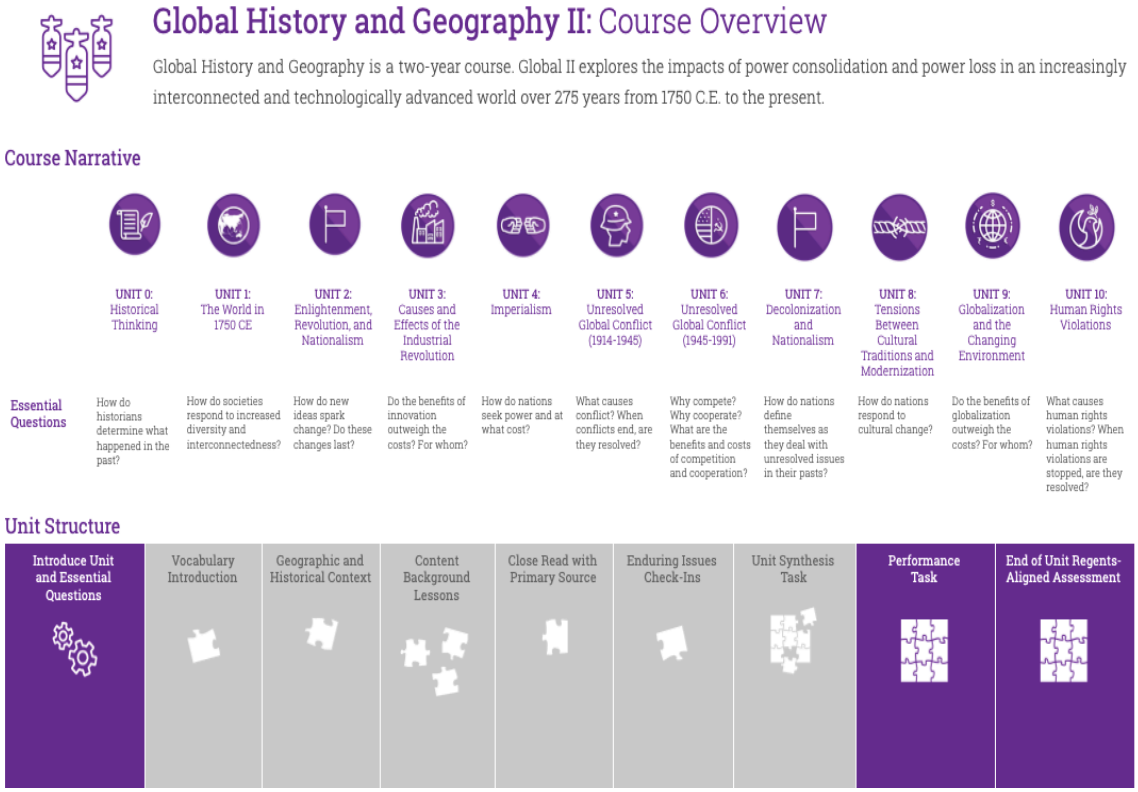
Curricular resources. Novel provides a series of unit-based, standards-aligned curricula curated and developed by the hub to support classroom-level instructional practice in history. One hub leader explains, *"We really pushed towards a different model that imagined a sort of common scope and sequence and set units across each of the major Regents courses".* Curricular resources in the history courses include scopes and sequences and lesson-level resources. Table 4.4 summarizes the key features of Novel curricula.

Table 4.4: Novel's Global History Curriculum Features

Curriculum Feature	Description
Scope and Sequence	Provides the scope and sequence of the unit, including unit name, essential questions addressed, and overall course and unit structure.
Daily Lesson Resources	Includes essential questions, formative assessments, vocabulary, learning plans/activities and texts.

Hub-developed scopes and sequences provide a broad overview of the structure of Novel's history courses at both the course and unit level. Unlike Apex's scopes and sequences that include detailed pacing for core content, Novel's scopes and sequences provide high-level descriptions of the overall organization of the course, and a broad overview of suggested unit structures. Figure 4.8 provides a sample scope and sequence.

Figure 4.8: Novel Scope and Sequence, Sample

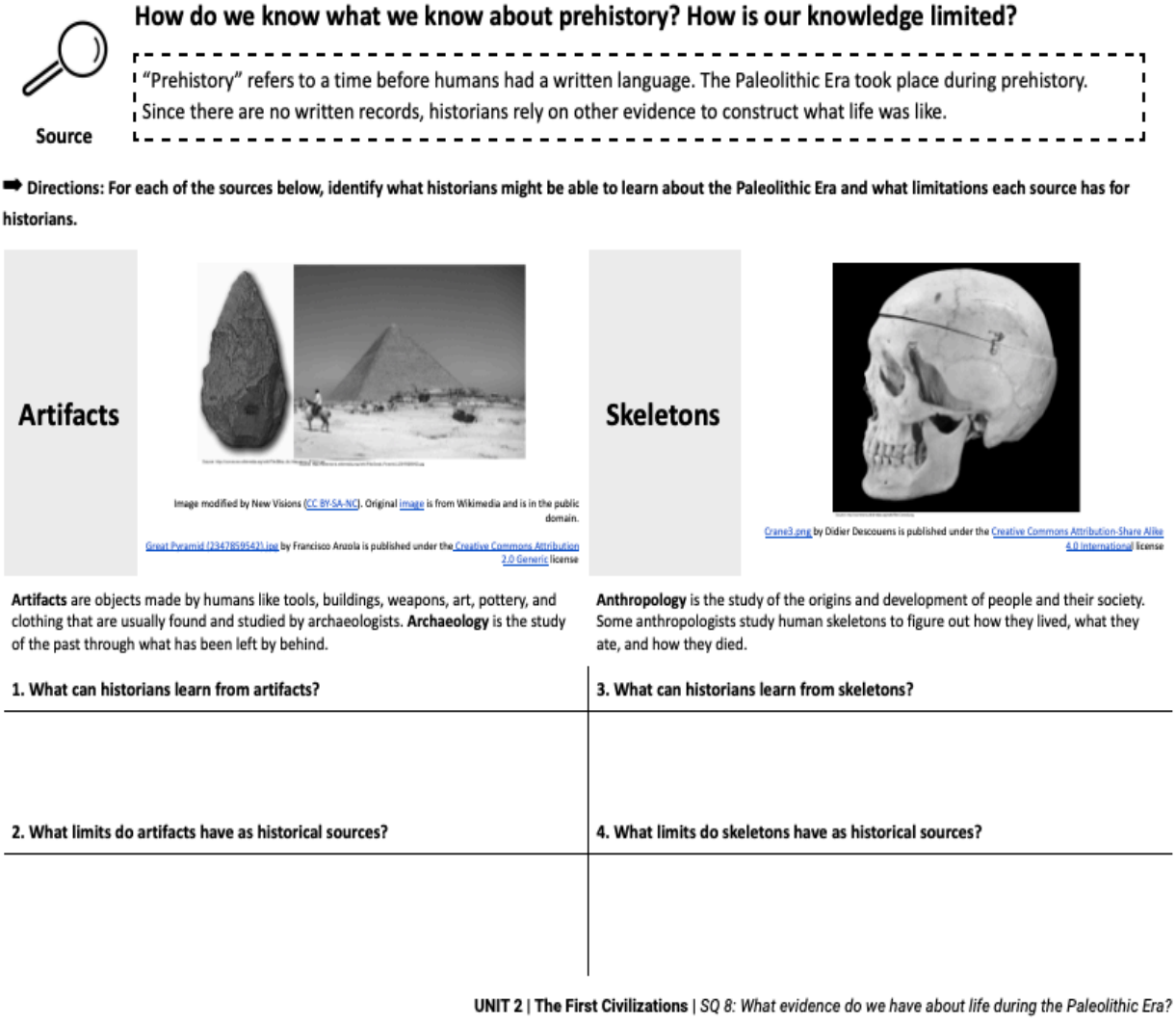


Similar to Apex, Novel's formal resources include a set of lesson-level resources used to guide teachers in designing their own day-to-day instruction. Lesson-level resources include learning goals, vocabulary, instructional activities, and texts. Unlike Apex that provides highly-specified resources for lesson enactment, Novel's lesson-level resources are organized as a collection of resources teachers can use to design their own instruction.

The intention of Novel's curricular resources is not to be prescriptive. Rather, hub leaders explained that the intent is to provide high-quality resources that teachers can modify in ways that meet the particular needs of their students. Daily resources are not scripted. Instead they provide a range of instructional activities that teachers can use and adapt when designing instruction. As one network instructional leader explains, *"Central to the philosophy is that teachers take what works for them and use it as a tool in their arsenal. Decisions are still up to them for what they pick and choose".*

Given this aim, Novel's curriculum is designed as an intentionally loose program of instruction. Although the curricula provide a comprehensive set of resources, Novel expects teachers to decide how best to use these resources with students. Figure 4.9 provides an excerpt from Novel's Global History course. See Appendix H for a full sample of a Novel lesson plan.

Figure 4.9: Novel Global History Lesson Plan, Excerpt



How do we know what we know about prehistory? How is our knowledge limited?

Source

"Prehistory" refers to a time before humans had a written language. The Paleolithic Era took place during prehistory. Since there are no written records, historians rely on other evidence to construct what life was like.

➡ **Directions: For each of the sources below, identify what historians might be able to learn about the Paleolithic Era and what limitations each source has for historians.**

Artifacts

Image modified by New Visions (CC BY-SA-NC). Original image is from Wikimedia and is in the public domain.

Great Pyramid (2347859542).jpg by Francisco Anzola is published under the Creative Commons Attribution 2.0 Generic license

Skeletons

Crane3.png by Didier Descouens is published under the Creative Commons Attribution-Share Alike 4.0 International license

Artifacts are objects made by humans like tools, buildings, weapons, art, pottery, and clothing that are usually found and studied by archaeologists. **Archaeology** is the study of the past through what has been left by behind.

Anthropology is the study of the origins and development of people and their society. Some anthropologists study human skeletons to figure out how they lived, what they ate, and how they died.

1. What can historians learn from artifacts?	3. What can historians learn from skeletons?
2. What limits do artifacts have as historical sources?	4. What limits do skeletons have as historical sources?

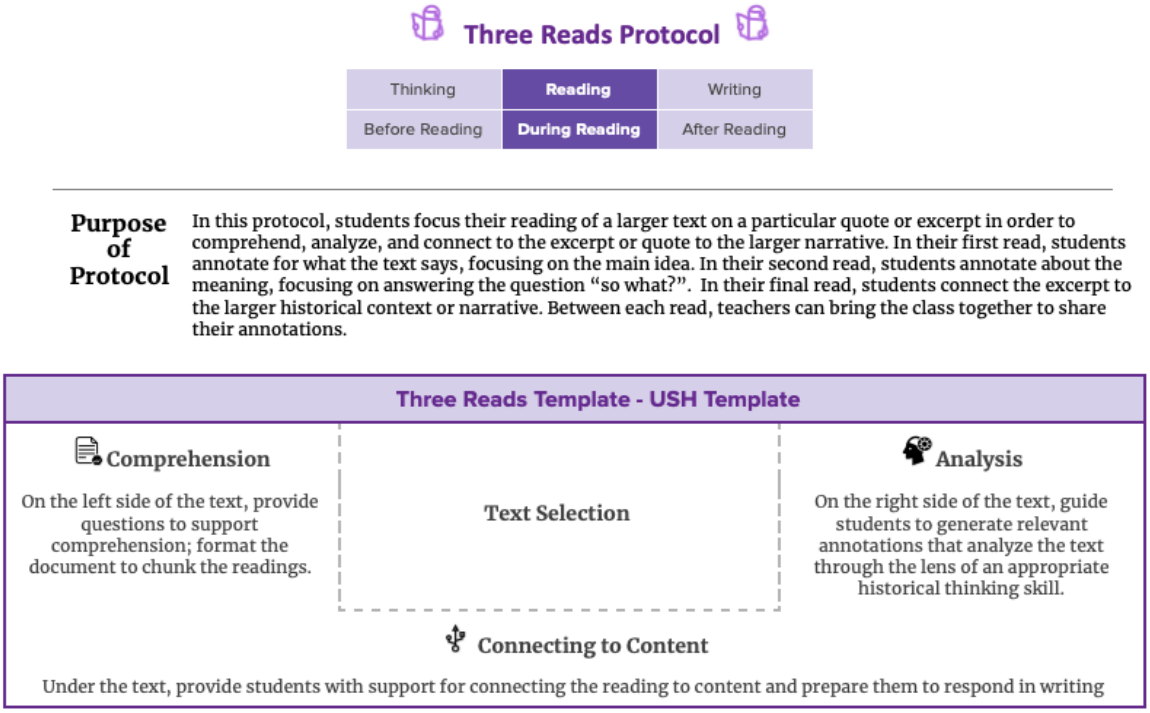
UNIT 2 | The First Civilizations | *SQ 8: What evidence do we have about life during the Paleolithic Era?*

Given the limited authority Novel has over its schools, the network does not (and cannot) mandate members to use the curriculum. Instead, the network uses an opt-in approach where teachers choose to use all, some, or none of Novel's curricula. In some cases, particularly when schools are struggling, local superintendents can and do require schools and teachers to adopt and use Novel curriculum, however, the hub does not make those mandates. Hub leaders explain that this opt-in approach is important to the network's instructional design as it builds a coalition

of willing participants to engage in its supports, and helps in establishing initial buy-in for network-based supports.

Instructional models. Novel provides some instructional models to support teachers in using the network's curricular resources. Instructional models include documents describing how to implement core instructional routines embedded within the history curriculum. Figure 4.10 provides an example of one such instructional model.

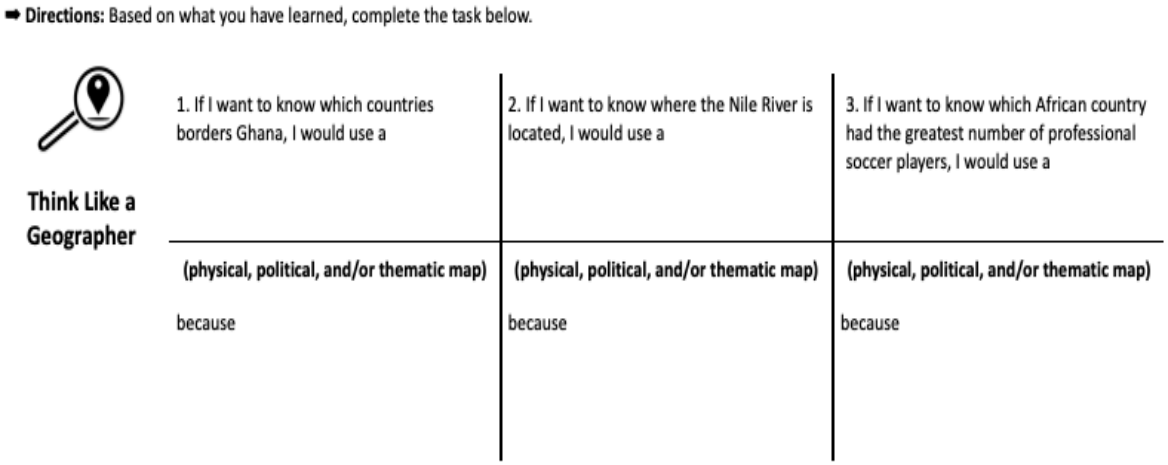
Figure 4.10: Apex Instructional Model



Assessments. A final component of Novel's formal resources includes a set of formative and summative assessments use to gauge student learning on key instructional goals. Within Novel's curricular resources are a series of lesson-level formative assessments embedded within the daily lesson resources. Teachers can choose to use/modify these formative assessments to gauge student learning. The hub also provides end of unit summative assessments. These include

Regents test aligned multiple choice and essay-based questions. Teachers choose to use/modify these formative assessments to gauge student learning. Figure 4.11 shows an example of Novel's formative provided in its curriculum.

Figure 4.11: Novel Formative Assessment, Sample



➡ **Directions:** Based on what you have learned, complete the task below.

Think Like a Geographer

1. If I want to know which countries borders Ghana, I would use a	2. If I want to know where the Nile River is located, I would use a	3. If I want to know which African country had the greatest number of professional soccer players, I would use a
(physical, political, and/or thematic map)	**(physical, political, and/or thematic map)**	**(physical, political, and/or thematic map)**
because	because	because

Social Instructional Resources

Whereas Apex provides a specified social infrastructure for instruction and instructional improvement, Novel has a comparatively looser design for social infrastructure. The hub establishes a set of expressed values and norms guiding the network, however, it has a more limited design for cultivating and recreating these values and norms across the network. This is evidenced through Novel's (a) less explicit mechanisms for developing initial shared commitment and (b) limited set of common practices used across the network to build base-level understandings, norms, values, and relationships.

Similar to Apex, Novel establishes a set of expressed core values for the network (see Table 4.5). However, Novel has comparatively fewer mechanisms for cultivating and recreating these core values in and among network members. For instance, Novel's contract with member

schools represents a looser, more temporary commitment. As an external service provider, Novel's contract with member schools outlines a set of services provided to member schools in exchange for payment from the NYCDOE (see Table 4.6). Schools enter into this contract for a three-year duration, after which schools reevaluate its membership within the network. While Novel's service contract outlines these services provided, it does little to establish initial shared agreements around a set of explicit understandings, norms, and values regarding instruction. This is in contrast to Apex's management contract that establishes explicit responsibilities of the hub around instruction and instructional improvement that member schools enter into as a basis of their continued, ongoing agreement.

Table 4.5: Novel's Expressed Core Values

Core Value
Demonstrate high expectations for student success.
Provide a rigorous and relevant education for all students.
Focus on high-quality teaching and learning.
Access unique resources provided by the hub

Table 4.6: Novel Services

Service
Leadership development and coaching
Data analysis and development of school specific data tools
Practitioner networks
Direct operational support (budgeting, scheduling, programming)
Policy analysis and research capabilities
Technical and Compliance support (preparation for annual DOE School Quality Reviews)

Moreover, Novel has more limited opportunities for developing, cultivating, and recreating common practices to help member schools actualize these core values in practice given the network's less comprehensive work with schools. As an external support provider, Novel's main context for instructional support is through PD. While Novel does establish some common practices through the context of PD, such as establishing practices for curriculum use, the hub does not (and cannot) establish common practices in other areas of instruction. For example, Novel does not work with schools around teacher evaluations, nor does Novel establish instructional or achievement goals for schools. Rather, Novel's schools develop their own values, norms, and understandings around these core components of instruction and instructional improvement.

Adaptation-based Design Principle

Novel's design for educational infrastructure reflects an overarching adaptation-based approach to instruction and instructional improvement. Two key components of Novel's educational infrastructure exemplify this approach: 1) Novel's less-specified resources focused on guiding, but not directing, day-to-day instruction and 2) Novel's expressed intention for supporting teachers in designing their own instruction.

Novel's design for educational infrastructure includes a set of less-specified resources that provide guidance to support (but not direct) day-to-day work. Novel's formal instructional resources include a range of technical materials from which teachers can design their own instruction. Teachers are free to modify and adapt these resources to meet the needs of the students in their classrooms. As such, Novel's curricular resources are less detailed and specified than that of Apex, leaving the overall instructional decision-making and design up to teachers. Moreover, Novel has a comparatively thin social infrastructure for instruction, suggesting that

schools themselves establish and cultivate unique values, norms, and understandings around core components of work.

Novel's hub staff explicitly expresses their intention for an adaptation-focused approach to instruction and instructional improvement. As one network leader explains, *"We want teachers to make adaptations. We want them to really be thoughtful about who their students are, what they need, what to emphasize, what to not emphasize, and make those adaptations."* Several other hub leaders expressed similar sentiments. With this intention, Novel designs its educational infrastructure to encourage and facilitate teachers' adaptive use. In particular, Novel's curricular materials include many more resources and lessons than could be reasonably taught in a unit in order to encourage teachers to make choices about what to use and how to use these resources. In the following chapter I will describe how Novel supports teachers adaptive use of the network's educational infrastructure.

Points of Comparison

In the previous section, I presented the designs for educational infrastructure in each network. Apex's design for educational infrastructure includes a set of highly-specified resources that establish explicit and actionable guidance for day-to-day practice. Novel has a comparatively loose design for educational infrastructure comprised of less specified resources to support teachers in instructional design. In this section, I compare network designs for educational infrastructure across the core components identified here: vision of instruction, formal resources for instruction, and social resources for instruction.

Vision of Instruction

Both Apex and Novel establish discipline-specific visions of instruction as core features of their design for educational infrastructure. These visions are built around practices central to

the discipline and the common core standards, and reflect leading research on instruction in this content area. This is in contrast to other designs for instruction and instructional improvement that do not offer an explicit conception of what constitutes high-quality instruction, or offers conceptions based upon more general and/or content neutral practices.

In establishing these visions, each network puts forth a normative conception of high-quality instruction that is coordinated with other components of the networks' educational infrastructure. In particular, both Apex and Novel coordinated their vision of instruction with formal resources for instruction by creating curricular materials that help actualize this vision. In doing so, Apex and Novel provide the tangible resources necessary to see what the network's vision of instruction might look like in practice, and provide detailed guidance to support teachers in carrying out that vision.

Formal Resources for Instruction

Central to each network's design for educational infrastructure are a set of formal resources for instruction meant to guide and support instruction across the network. For both Apex and Novel, formal resources for instruction serve as mechanisms to help teachers in actualizing the network's vision of instruction, coordinating supports across the instructional design, and developing a common language and set of practices used across the network. However, the networks' formal resources for instruction also reflect different underlying assumptions about instruction and instructional improvement in each of the networks.

Mechanism for actualizing instructional visions. Both networks' formal resources for instruction provided a set of technical tools that help teachers to operationalize its vision of instruction in practice. For example, Apex's daily lesson resources include explicit and actionable direction for classroom-level practice through lesson scripting, sequencing, and

assessment. The network's models of instruction provide exemplars of practice to support teachers in building understandings around the hub's conception of high-quality instruction. Novel's formal resources also provided detailed, but comparatively less-specified, guidance for instruction that was coordinated with the network's vision of instruction. For both networks, this guidance provided the tangible resources necessary to see what the network's vision of instruction looks like in practice and provided the methods for operationalizing that vision in classrooms.

Establishing common language and practice. Beyond providing a set of technical tools to operationalize the networks' visions of instruction, the formal resources for instruction also helped to establish a common language and set of practices used across the network. For Apex, teachers followed lesson scripting and sequencing in their lessons with fidelity. This suggests a level of consistency in instruction across the network that supports teachers in talking about practice in common ways. I take up this topic in more detail in the following chapter. Although Novel teachers use the network's formal resources for instruction differently, a common collection of instructional resources provided the substance around which member schools could interact. As explained by one network leader:

> *I think what we're trying to get to is a place where there's something to ground your engagement with schools that's at the student level […] that serves as an organizer for conversations and also a check on the tendency to push and pull schools in a million directions […].*

Common curricular resources enabled conversations among teachers and created shared experiences around which teachers could collaborate. This was pivotal in developing the Novel network as it was what connected otherwise unconnected schools in the network. For Apex, common language and practices helped to establish a distinct network culture permeating across a large and expanding network.

Differing assumptions regarding instruction. While each network established a set of formal resources for instruction, the networks' designs for the formal resources for instruction reflect fundamentally different assumptions about instruction and instructional improvement in the networks. Undergirding Apex's design is the assumption that practice can be specified, routinized and, to a certain extent, decontextualized. This is evidenced by Apex's set of highly-specified formal instructional resources that deconstruct practice through explicit practices and detailed sequencing of instruction. Novel's formal resources for instruction, on the other hand, assumes practice cannot be divorced from context, nor can it be specified or routinized in the way Apex does. This is evidenced by Novel's deep commitment to local adaptation of their formal resources as teachers design their own instruction.

Social Resources for Instruction

The networks vary in the level of design for social infrastructure. Apex establishes a specified approach for developing, cultivating, and recreating a set of understandings, norms, and values across the network. Novel, on the other hand, establishes a set of core values, but provides a limited infrastructure to cultivate and recreate these values in practice. The difference in the networks' designs is a function of 1) how the networks establish initial shared commitment between the hub and members and 2) the networks' context for cultivating and recreating shared commitment.

Establishing initial shared commitment. Apex and Novel vary in how the networks establish initial shared commitment between the hub and members. Apex uses a management contract that explicitly establishes responsibilities of the hub around instruction and instructional improvement. When network members enter into this agreement, they agree to a set of basic understandings, norms, and values around the relationship between the hub and member schools

regarding instruction. As explained by network leaders, Novel's contract with member schools outlines a set of services provided to member schools in exchange for payment from the NYCDOE. However, this arrangement does not establish a set of understanding, norms, and values around instruction and instructional improvement.

Cultivating shared commitment. The networks also vary with regard to the context for cultivating and recreating shared commitment. As a CMO, Apex's hub has control over a wide-range of areas around instruction and instructional improvement, including establishing and monitoring instructional goals and outcomes, school and teacher evaluation, and teacher and staff development. As such, the hub establishes social infrastructure, such as common school-level practices, across a variety of areas. As an external support provider, Novel has more limited control in the area of instruction and instructional improvement. Novel's main context for instructional support is through PD. The hub is not able to establish certain social infrastructure, such as school-level practices, to help cultivate and recreate shared commitment at the school site.

Fidelity and Adaptation

Apex's and Novel's designs for educational infrastructure show evidence of critical differences in the networks' overarching design principles. As described above, Apex has an explicit and actionable design for educational infrastructure comprised of highly-specified visions of instruction, formal resources for instruction, and social resources for instruction. These highly-specified resources and established expectations for how resources are to be used in practice represents a fidelity-based approach to instruction and instructional improvement. Novel, on the other hand, has a comparatively looser design for educational infrastructure with a

less specified educational infrastructure and professed intention for an adaptation-focused approach to instruction and instructional improvement.

Fidelity/adaptation as intentional design principles. Although each network's design reflects different approaches to designing educational infrastructure, both networks actively build the features of fidelity or adaptation into their respective models. This is to say that each network is intentional in designing for fidelity of use (in Apex) and adaptation (in Novel) within their program, and this was not simply a byproduct of their work. For example, Apex designs for fidelity by establishing highly-specified instructional guidance and mandating its use in practice. Novel designs for adaptation by establishing less specified resources and supporting network members in designing their own instruction.

Differences in beliefs around capacity. Differences in fidelity-based and adaptive approaches underscores fundamental distinctions in how these networks view capacity in the network--both in terms of how capacity is built and where capacity lies in the network. Apex's design suggests that faithful implementation of highly-specified instructional practices builds instructional capacity. Novel's design suggests capacity develops through the adaptation of instructional guidance. This points to where the networks think capacity lies in the organization. At Apex, instructional design occurs at the hub level, suggesting that the network sees instructional capacity (including time, resources and skill) existing at the hub. At Novel, although much of the design work is done at the hub level, this design operates more as a template for instruction where teachers are expected to adapt the curricula to meet the needs of the local environment. This suggests the network sees instructional capacity as shared between the hub and schools, with ultimate decision-making expertise residing at the classroom-room level.

Role of Network Dimensions

Apex and Novel are different types of networks, varied in network structure, governance, composition, and purpose. These differences in network dimensions help to explain major distinctions in network designs. In the case of Apex, the designs for educational infrastructure appear to be shaped by the network's centralized structure, governance over instructional decision-making, homogenous network composition, and focus on network-wide scale-up. In the case of Novel, by contrast, the designs for educational infrastructure appear to be shaped by the network's decentralized structure, limited governance over instructional decision-making, heterogenous network composition, and focus on building a system of supports. In this section, I present on how network dimensions help to explain differences in Apex's and Novel's design.

Network Structure and Governance

Each network has fundamentally different structures and systems of governance within its network. Apex is a centralized network organized as a hierarchy, similar to that of a traditional school district. As a hierarchy, the network hub is connected to schools through regional superintendents. Regional superintendents work directly with school leaders, and school leaders work directly with deans and teachers. Within this structure, the hub and member schools have distinct roles and responsibilities as laid out in the network's charter management contract. Under this contract, the hub is responsible for instructional decision-making and member schools are expected to use all hub-developed educational infrastructure, including hub-developed formal and social resources for instruction. As a centralized network, the hub also has oversight responsibilities over member schools. This includes monitoring and evaluating school leaders, as well as monitoring school-level performance.

Apex's strong network hub empowered with authority over both instructional design and network oversight creates a set of conditions conducive to a fidelity-based approach to instruction and instructional improvement. Given the hub's authority over instructional decision-making and member schools' responsibility to use hub-developed infrastructure, there is little room for substantial deviation from the network model. This suggests a fidelity-based approach fits with the broader structure and organization of the network.

The centralized system of monitoring and oversight directed by the strong network hub serves to reinforce a fidelity-based approach to instruction and instructional improvement. Hub monitoring and oversight functions, such as leadership evaluations and monitoring of school-level performance, serve as mechanisms for the hub to both monitor and promote faithful implementation of the Apex model.

As an external support organization operating in the non-profit sector, Novel partners with member schools to provide a set of instructional and operational supports directly to schools. The network has a more decentralized structure where the hub works directly with school leaders and teachers to provide support to member schools. Under its contract with the NYCDOE, Novel provides a set of supports to schools, but formal authority over instructional decision-making and school evaluation is outside the scope of its work with schools. Rather, authority over instructional decision-making rests with local superintendents or the school itself.

As a more decentralized network that lacks formal authority over schools, Novel faces a different set of conditions under which they are designing. Unlike Apex where using network-developed supports is established as a condition of partnership in the network charter, Novel builds its design around a voluntary, opt-in approach. This voluntary approach allows Novel to

circumvent its lack of formal authority over schools by incentivizing resource use in exchange for content-based PD.

Moreover, Novel has no evaluative or monitoring authority over schools. The lack of formal authority over schools, paired with limited evaluative or monitoring authority, creates conditions that were more conducive to an adaptive approach to instruction and instructional improvement. Under this approach, member schools choose to take up and use those aspects of the instructional design most applicable to their needs, and the network need not directly mandate nor monitor their use in practice. Novel sees this opt-in approach as critical to its design for educational infrastructure as it helps to create a sustained will among teachers to actively engage with the network design.

Network Composition

In addition to differences in governance and accountability structures, Apex and Novel work with different compositions of member schools. Comparatively, Apex works with a more homogenous composition of schools than Novel. Given Apex's organizational mission to provide high-quality educational alternatives in traditionally underserved areas, the network locates schools in areas with relatively similar contexts and student demographics --urban areas serving predominantly at-risk and low-income students. Although differences certainly exist between regions, schools, and the students within them, one can argue there is a set of challenges endemic to serving traditionally underserved students. Moreover, being an Apex school brings with it a level of shared identity and experience. For example, network goals, initiatives, and structures are common across Apex schools, further adding to a level of commonality across schools in the network.

The homogeneity of Apex's composition creates conditions more conducive to a fidelity-based approach to instructional improvement. Given that Apex supports a collection of more homogeneous schools, members are more likely to benefit from a similar set of supports and practices as they are seeking to address more similar challenges. This suggests that specifying and routinizing practice may be a feasible and practical approach to instruction and instructional improvement in this particular network. Moreover, hub leaders describe that network teachers tend to be more novice. Hub leaders believe that providing a set of highly-specified and actionable resources can help those less experienced teachers to more quickly teach in rigorous ways.

In contrast, Novel works with a more heterogeneous set of schools that vary in their individual needs and goals. Unlike Apex that builds its own schools focused on specific network goals and initiatives, Novel manages a portfolio of district schools that vary across a range of dimensions, including location, size, socioeconomic status, achievement, among others. Given that Novel schools are under the formal authority of the NYCDOE and their local superintendent offices, there are often a range of mandates, goals, and initiatives at play across member schools. This more heterogeneous composition of schools suggests a wider range of challenges for which the network must design. As a result, specifying and routinizing practice may be less feasible and practical in this type of network, underscoring the need for a more adaptive approach to instructional improvement.

Network Purpose

Furthermore, the purpose for which these networks are designing also shapes the conditions under which these networks operate. As a network that has been engaged in the work of instruction and instructional improvement for 20 years, Apex is no longer building a network

design, but focusing on refining and replicating that design as they scale-up its network. Over time, the network has been able to curate a set of best practices, develop resources to support their use, and test their effectiveness in practice. As a result, the network offers a vetted program of instruction that, when replicated, helps the network to scale-up. The design allows new schools to get up and running by providing a highly-specified educational infrastructure that can quickly and effectively scale-up a high-quality educational design.

Beyond scaling up to new schools, a highly-specified design helps Apex to support a wide network of schools that spans across five geographic regions in three states. Despite geographic distance between member schools, a highly-specified educational infrastructure creates a level of consistency in instruction across the network. This consistency helps Apex to provide specific, practice-based network support to its members. I discuss this topic in more detail in the following chapter.

Moreover, Apex operates in a charter market where networks compete with local districts and other charters to provide educational opportunities to students. In order to compete in this market and fulfill the network goal of outperforming local districts, Apex is concerned with demonstrating and maintaining high-quality results on measures of student achievement. As the CCSS raised the bar for rigor in instruction, Apex found it necessary to explicate its educational infrastructure to better prepare its teachers to meet these standards.

Novel is newer to the work of instructional improvement and is not focused on replicating a model. Rather, the network is focused on building a program to support a diverse set of schools with individual needs and different mandates. Novel moved away from an instructional model focused on supporting individual teachers to unit and lesson plan, to a model where the hub develops curricula and supports teachers in adapting that curricula to meet the

needs of their classroom. Novel is also in the process of developing instructional support for school instructional leaders and thinking through how best to support implementation of its curricula at the school-level--a topic I take up in more detail in the following chapter. This suggests that Novel is in a developmental phase of its work, focusing on building a system of supports to offer member schools. Novel's design and practices have not been vetted in the same way that Apex's have, nor is Novel seeking to replicate and scale-up in the same way. Using a more adaptive approach to instructional improvement provides the opportunity for schools and teachers to reconcile Novel's developing design with what they know to be true and necessary in their own contexts.

Moreover, Novel operates in the non-profit sector and works with the NYCDOE and member schools on a three-year contract. As such, Novel is particularly sensitive to client satisfaction with its services. This, in part, can help to explain Novel's adaptive approach to instructional improvement that seeks to maintain instructional decision-making at the school level. Novel's adaptive approach provides a level of flexibility that can better accommodate the local needs of Novel's member schools and other district entities to remain in good standing with those who use its services.

Discussion

In this chapter, I have presented the designs for educational infrastructure in each network. As described above, the key point of differentiation lies in the relationship between (a) the specificity of the designs and (b) different emphases on fidelity vs. adaptation in implementing those designs. Whereas Apex features a highly-specified design with an emphasis on fidelity, Novel features a comparatively loose design with an emphasis on local adaptation. Apex's design for educational infrastructure appears to be shaped by the network's centralized

structure, governance over instructional decision-making, homogenous network composition, and focus on network-wide scale-up. Novel's design for educational infrastructure appears to be shaped by the network's decentralized structure, limited governance over instructional decision-making, heterogenous network composition, and focus on building a system of supports.

This analysis raises several important points for consideration about network designs for educational infrastructure in the NSI studied here. One such point is the relationship between designs for infrastructure and visions for instruction. Despite differences in the designs for educational infrastructure, Apex and Novel established explicit and specified visions of instruction. In both networks, these visions of instruction were clear, content-based, and reflected leading research on pedagogical approaches in the content areas. Other components of the networks' educational infrastructure, such as the formal and social resources for instruction, served to support practitioners in actualizing these visions of instruction by providing a set of technical and social resources to guide instruction. This approach differs from other types of educational networks/organizations that delegate developing conceptions of high-quality instruction to local schools and teachers. Organizing designs around specified visions of instruction allows the networks to coordinate other elements of educational infrastructure, such as curricula, PD, and coaching, around that vision in ways that support network-wide movement towards actualizing that vision of instruction. I discuss this topic in more detail in the following chapter.

Another point for consideration is the relationship between increasing maturation of the networks and their guidance for instruction. The networks studied here both exhibited a trend toward providing more (and more explicit) formal resources for instruction to support school-level practice. In recent years, both Apex and Novel moved away from supporting teachers

around unit and lesson planning, and invested in establishing full-course curricula and corresponding instructional resources. This suggests that each network views formal resource development as an important feature of supporting and improving instruction across the network, and that over time both networks found a need to establish and explicate their formal resources for instruction.

A final point of consideration is the relationship between the networks' designs for educational infrastructure and their overarching design principles. Apex uses a fidelity-based approach to instruction and instructional improvement and Novel an adaptive approach. These differing principles help to explain key distinctions in the networks' designs, such as specificity of resources and expectations for use. It also points to underlying assumptions about where capacity exists and how capacity is built in the network. As described in this chapter, network structure, governance, composition, and purpose help to explain, at least in part, why these networks assume these contrasting design principles.

While this chapter raises important considerations involving network designs for educational infrastructure, analyzing network educational infrastructure alone only takes us so far. To more fully understand network designs for instruction and instructional improvement, we need to know more about how these networks support educational infrastructure use in practice, and how network dimensions potentially explain this design. I take up this call in the next chapter by describing network designs for supporting the use of educational infrastructure in practice. In this chapter, I leverage critical similarities and differences across networks. I also analyze how network dimensions help to explain these designs.

CHAPTER 5

Findings: Supporting the Use of Educational Infrastructure in Practice

In this second findings chapter, I examine network designs for supporting educational infrastructure use in practice, and I explore how network structure, governance, composition, and purpose shape and influence network designs. I do this in three steps. I begin by describing each network's design for supporting educational infrastructure use in practice. I then compare network designs to identify key points of similarity and difference. Finally, I describe how network structure, governance, composition, and purpose help to explain major differences in network design.

In analyzing the designs for supporting the use of educational infrastructure in practice, a key distinction lies in the relationship between (a) the set of mechanisms used by the network to support implementation and (b) the intended product of their design. Apex uses a set of highly-specified routines and resources to heavily train and coach network members around its educational infrastructure. The intended product of this design is a version of instruction that is defined by the network. Apex's centralized structure, governance over instructional decision-making, homogenous network composition, and focus on network-wide scale-up shapes this design for support. By contrast, Novel establishes joint work opportunities to support teachers in using its infrastructure to develop adaptive, classroom-level practices. The intended product of this design is a version of instruction that is informed by the network's conception of instruction,

but developed by teachers to meet the needs of their classroom. Novel's decentralized structure, limited governance over instructional decision-making, heterogenous network composition, and focus on building a system of supports helps to explain this design.

The preceding, in turns, suggests two key points for consideration in network designs for supporting infrastructure use: 1) one such consideration involves the relationship between network structure and points of leverage for implementation support; 2) another point of consideration involves the nuanced relationship between fidelity and adaptation in supporting implementation.

The Case of Apex

Apex's design for supporting the use of educational infrastructure in practice involves heavily training and coaching network members around the use of its educational infrastructure. The network does so by using a set of highly-specified routines and resources to support fidelity of use. The intended product of this design is a version of instruction that is defined by the network. In this section, I describe the three key features of Apex's design for supporting infrastructure use: hub-based supports, school-based supports, and implementation tools and guidance. Figure 5.1 presents an overview of Apex's supports for educational infrastructure use in practice.

Figure 5.1: Apex's Supports for Educational Infrastructure Use

Hub-based Support

One mechanism for training and coaching network members is through hub-provided PD for Apex teachers and school leaders. Apex teachers receive (3) content-based PD days during the summer and approximately (2) PD days throughout the school year. School leaders receive (2) content-based PD days during the summer. School leaders also receive monthly cohort-based PD during the school year. There are additional PD days in the summer for new teachers and leaders. The broad aim of teacher and school leader PD is to build capacity and expertise around the network's educational infrastructure in order to implement it with fidelity. The hub does this by providing opportunities for (a) making sense of the network's educational infrastructure, (b) seeing and practicing implementation of that infrastructure, and (c) norming practice to that infrastructure.

As evidenced in observations of hub-led PD, Apex uses a common set of routines to train teachers and school leaders on the network's educational infrastructure. These routines include 1) building shared understandings of curricular resources, 2) viewing exemplars of practice, and 3) rehearsing practice. The hub's routines serve to establish common understandings around the network's educational infrastructure. It also serves to norm teachers' and leaders' practice to that infrastructure.

Apex uses routines for building shared understandings of the network's curricular resources. In doing so, the hub is able to norm teachers to the intent and purpose of these resources as established by the hub. As explained by a content area specialist, *"My primary goal [for PD] at the beginning of the school year is that teachers have a really clear vision for what classroom instruction should look like in our network."* Apex's established routines in PD sessions help to build a clear vision of instruction for teachers and leaders.

For instance, in one PD session for history teachers, the session began with a hub-facilitated discussion of a daily lesson resource. In this discussion, teachers read through each portion of the lesson and the facilitator asked the teachers specific questions about that resource. Questions asked included items such as, "*what is the purpose of the first loop of instruction?", "how is the first loop distinct from later loops?*" and, "w*hat should an exit ticket look like in an inquiry-based lesson*?". Through these discussions, hub leaders surfaced teachers' thinking around the intent of these resources. When surfaced, hub leaders could redirect teachers' thinking to better align with the intent as designed by the hub. This type of routine was observed in 9 out of 15 (.60) PD sessions observed.

Another typical routine observed in PD sessions was viewing and analyzing video exemplars of practice. During these sessions, teachers viewed a portion of a lesson enacted

by a high-performing network teacher. After viewing the video, the hub leaders facilitated a discussion around best practices observed in the video. A similar routine was used in leadership PD. Leaders watched portions of an instructional coaching session conducted by a high-performing academic dean or principal. It followed with a hub-facilitated discussion around the best practices observed in the video. The use of video in PD sessions was observed in 8 out of 15 (~.53) sessions.

As described by hub leaders, the use of video helps to build teachers' and leaders' understandings of the network's vision of instruction and instructional resources. One content area specialist described:

> *We wanted to get really, really clear about what historical inquiry meant. […]. I spend a good deal of that summer PD using videotape to help teachers see what are the components that make this part of the instruction really strong.*

Yet another routine observed across PD sessions was rehearsals of practice. For teachers, this involved rehearsing small portions of a lesson, such as framing a lesson. For school leaders, this involved rehearsing small portions of an instructional coaching session. Teachers and leaders rehearsed for a peer who then provided feedback to their partner. This was followed by a whole group discussion where facilitators provided feedback to participants regarding the strengths and weaknesses of these rehearsals. Rehearsals were observed in 9 out of 15 (.60) PD sessions.

In using these routines, the hub helped to establish common understandings around the network's educational infrastructure. It did so by surfacing practitioner thinking, and facilitating dialog around the intent and substance of the network's educational infrastructure. These routines also served to norm teacher and leader practice to the educational infrastructure as conceptualized by the hub. It did so by presenting exemplars of practice, and reframing/norming practitioners to that exemplar.

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In addition to the PD described above, Apex also organizes school leadership cohorts that serve as communities of practice for principals and academic deans. School leadership cohorts meet monthly with hub leaders and colleagues within their region. As described by hub leaders, school leadership cohorts serve as the network's "*vehicle for collective problem solving, supporting each other, vision, and strategic decision making".* Similar to other hub-led PD, school leadership cohorts provide a space for leaders to build capacity around Apex's educational infrastructure through practice and norming. For example, one PD meeting focused on watching videos of teacher instruction and norming school leaders around the network's evaluation tool. A school leader provides the following description of a cohort meeting.

> *It's where we engage in both skill-building, norming, and resource sharing. This morning, all of us—principals and the humanities team -- met to align on our vision of rapid feedback. We all shared videos of teachers across our schools, and we normed on the scores we would give them on a rapid feedback rubric.*

Cohort-based PD also creates opportunities for collaboration and resource sharing. As one principal described, "*We'll often share our PD plans with each other".*

School-based Support

The hub establishes a set of broad routines to organize PD and coaching at the school-level. This includes weekly school-based PD for teachers, and weekly school-based coaching for teachers and school leaders. Similar to hub-provided support, school-based support aims to

develop teacher capacity around Apex's educational infrastructure. While the hub establishes a set of broad routines for school-based PD and coaching, school leaders have some discretion in how they implement these routines in their schools.

PD. Per Apex's design, all schools provide teachers with weekly, school-based PD to support the use of the network's educational infrastructure. The exact content and format of the school-based PD varies by school, but PD frequently involves a combination of the following: instructional preparation, analyzing student work, skill practice, and team rituals. As described in organizational documents, the hub provides broad recommendations for PD structure and substance, but school leaders have discretion in how they implement PD at the school site. One school principal explains how its school has chosen to organize their PD for the 2017-2018 school year.

> *Every morning on Fridays we cancel interventions and there's grade team meetings in the morning for 50 minutes. Then we have a three-hour block in the afternoon from 2-5 where we have one hour of content time, which is typically looking at student work, one hour of skill building that is the school-wide priority focus, and 1 hour where we do adult culture work […].*

Coaching. Per Apex's design, both teachers and school leaders receive frequent, practice-based coaching at the school site. As established as a common practice by the hub, school leaders conduct weekly coaching cycles with teachers. Each teacher receives approximately two hours of coaching per week. One hour consists of core coaching. Core coaching typically includes: 5 minutes personal check-in, 5-10 minutes of lesson plan review, 40 minutes devoted to observation feedback and practice, and/or co-planning. The additional hour is drawn from a menu of items based on teacher skill and need. Some of these options include: instructional preparation, analysis of student work, co-observations, video analysis, and/or additional observations and feedback.

Teacher coaching sessions are heavily practice-focused and tailored to meet the needs of individual teachers. During a typical coaching session, teachers rehearse enactment of Apex lessons and academic deans provide feedback. In some cases, academic deans model instruction for teachers, or teachers and coaches watch video exemplars together. Deans differentiate coaching based on the individual needs of their teachers. As explained by one school leader,

> *We very much differentiate based on what we're seeing as gaps and the extent to which the teachers are on or off vision in their data and in the walkthroughs. There are some teachers that are meeting daily with the deans for feedback, practice, and scrimmaging, and there are other teachers that in terms of formal meetings are every other week […].*

Figure 5.2 shows a sample schedule for weekly school-based coaching and PD at Apex for teachers.

Figure 5.2: Apex Sample Schedule for Weekly School-Based Coaching and PD

Monday	Tuesday	Wednesday/ Thursday	Friday
Teachers submit preparation materials to academic deans	Teacher observations and feedback meetings	Instructional coaching sessions for teachers	School-based PD

School leaders receive ongoing, weekly coaching from regional superintendents. Similar to teacher coaching, leadership coaching sessions are practice-focused and tailored to meet the needs of individual leaders and schools. As described by all regional superintendents interviewed, leadership coaching sessions typically include walkthroughs, co-observations, discussions of weekly teacher data, goal setting, and discussions of problems of practice. One regional superintendent describes a typical school visit:

> *Every week I lead an instructional leadership team with all of my principals and deans. Its heavily practice-based. It usually focuses on either observational feedback or looking at student work meetings. Then often in the walk-throughs that I do, it's the principal and a dean.*

Another regional superintendent describes the substance of their weekly coaching session as "*we zoomed in on what does excellent practice look like in a coaching meeting. We looked at the rubric. I showed a video of a coach leading a teacher in some role play and practice."*

Table 5.1: Apex's Hub-based and School-based Support: Frequency and Total Time

	Teachers	School leaders
Hub-Based Support	5 days/year (~40 hours)	10 sessions/year (~40 hours)
School-Based Support	5 hours/week (~210 hours)	2 hour/week (~84 hours)
Total	~250 hours/year	~124 hours/year

Tools and Guidance

In addition to hub and school-based PD and coaching, Apex uses a set of highly-specified tools to support the use of the network's educational infrastructure in practice. These materials provide explicit guidance to help network members in using the network's educational infrastructure.

Arc of the year. As described above, school leaders organize school-based PD and coaching for teachers throughout the school year. The hub-developed arc of the year establishes top priorities for PD and coaching to assist school leaders in organizing this work. As described in network organizational documents, the purpose of the arc of the year is to establish priorities for skill building in what the hub sees as critical areas of practice in order to "deeply align on our most important priorities". School leaders decide how best to align school-based PD and coaching to these priorities with the help of hub-provided guidance, including timelines, roles and responsibilities, and strategic exemplars. As described in organizational documents:

> *[Arc of the year guidance] is a roadmap; it is not a school-based strategic plan. Winning on the Arc of the Year is contingent upon a school's ability to operationalize what is captured in this resource.*

See Appendix H for sample arc of the year guidance. Figure 5.5 shows the Arc of the Year schedule for the 2017-2018 academic year.

7 out of 8 interviews across the network identify the arc of the year as a central component for supporting instructional improvement in the network. Across these interviews, respondents explain how the arc of the year assists in providing site-based support. As one hub leader explains:

> […] because our program is so complex effectively what we do is we provide a breakdown of week one to week six focus on this part of our program, week seven through week eleven focus on this part of our program, etc. It goes through the entire year.

Others describe the arc of the year as, *"providing us great focus", "giving us very clear measures for each part of the year"*, and helping to *"align our school-wide focus".* Figure 5.3 identifies the Arc of the Year schedule for the 2017-2018 school year.

Figure 5.3: Apex 2017-18 Arc of the Year Schedule

Schedule	**Focus**
Weeks 1-6	Core Culture and Academic Foundation
Weeks 7-11	Core Rigor Foundation
Weeks 12-17	Thinking and Engagement
Weeks 18-24	Response to Data
Weeks 25-34	Crescendo
Weeks 35-end	Readiness

Protocols for formal resource use. The hub establishes two core protocols to support teachers and leaders in using Apex's formal resources for instruction. These tools provide highly-specified routines to help teachers 1) understand curricular resources and prepare for their use in practice and 2) analyze student work to improve instruction. These tools also establish

highly-specified routines to support school leaders in coaching teachers around the network's formal resources.

Intellectual preparation protocol (IPP). Apex's IPP are used in teacher coaching sessions to facilitate front end instructional preparation around the network's daily lesson resources. As described in Apex's organizational documents, the goal of an IPP is to *"ensure that teachers deeply know the goals, big ideas, and rigor of the plan, understand how the lesson will achieve those goals, and can anticipate and respond to errors"*. As part of this protocol, teachers read and annotate the daily lesson, and complete a planning form asking teachers a series of questions to support preparation around the lesson. For instance, this form asks teachers to articulate evidence of lesson success, develop exemplars of lesson assessments, identify potential student conceptions and misconceptions, and plan for opportunities for student feedback. This preparation is completed in advance of meeting with an instructional dean for weekly coaching meetings.

IPPs also serve as a tool to guide weekly teacher coaching sessions. One principal describes how academic deans use the IPP in coaching sessions.

> *If you're a teacher in my building, you would have your daily lesson level resources, you would complete your IPPs […]. You would complete the exemplar, you would design your back-pocket questions, your questioning sequence, and then you would scrimmage that lesson with the academic dean to rehearse it and get feedback on the execution of that lesson that day.*

All respondents identified IPPs as a central component of the network's design for instructional improvement.

Looking at student work protocol (LASW). Apex's LASW protocol is used in PD to facilitate teacher reflection on their practice by analyzing exemplars of student work. As described in organizational documents, the purpose of the LASW protocol is to uncover scholar

misconceptions at the school site, and to norm teacher and leader conceptions of exemplar work. The protocol is organized into four phases, including norming on excellence, focusing on whole class trends and traction points, focusing on instructional next steps, and conducting sub-group analysis. It aims to guide teams of teachers and leaders in systematically analyzing student work, and developing action steps for modification of practice. The protocol provides guidance for use by identifying meeting objectives, agendas, pre-work, activities, and a timeline for work.

As described in organizational documents, school leaders have discretion in how LASW protocols are implemented in practice. This protocol can be used with a single teacher or with a group of teachers. School leaders can decide which course or teachers to prioritize in this work. School leaders can also decide if they want to include LASW as a component of their coaching or PD sessions, or if they want to facilitate LASW in a different way in their schools. One principal describes their use of LASW at their school.

> *We spend that Friday time engaging and looking at student work to action plan around the weekly quiz that was given in the classes that week. You would identify the gaps, you would do the standards deep dive, unpacking, and then you would plan the re-teach.*

7 out of 8 respondents identified LASW as a central component of the network's design for instructional improvement.

As described throughout this section, Apex's design for supporting the use of educational infrastructure in practice involves heavily training and coaching network members around the use of hub-developed educational infrastructure. The network does so by using a set of highly-specified routines and resources. Through the use of hub-based support, school-based support, and tools/guidance, Apex's design seeks to build shared understandings of the network's educational infrastructure, and seeks to norm practice to that infrastructure. The intended product of this design is a version of instruction that is defined by the network.

The Case of Novel

Novel supports the use of educational infrastructure in practice by establishing joint work opportunities to support teachers in using said infrastructure to develop adaptive, classroom-level practices. Novel's hub-based support, limited school-based support, and implementation tools/guidance seek to support practitioners in using the network's educational infrastructure to design instruction that meets the needs of individual classrooms. The intended product of this design is a version of instruction that is informed by the network's conception of instruction, but developed by teachers to meet the needs of their classroom. In this section, I describe the three key features of Novel's implementation system: hub-based supports, school-based supports, and implementation tools and guidance. Figure 5.4 summarizes Novel's supports for educational infrastructure use in practice.

Figure 5.4: Novel's Supports for Educational Infrastructure Use

Hub-based Support

Novel's main support for network members is hub-based PD. Yet, whereas Apex's PD focuses on faithful implementation of instructional guidance, Novel's PD aims to support

teachers in using and adapting resources to meet the needs of their classroom using opportunities for joint work.

The hub provides PD in each history course in which Novel has curricula. PD sessions for teachers occur before the beginning of each unit, roughly every six weeks. As evidenced through observations of PD, sessions typically provide time for teachers to reflect on their practice with colleagues, unpack the big ideas of the upcoming unit, work in small groups to discuss problems of practice, and plan collaboratively for adaptive use of curricular resources to meet the needs of individual classrooms. One hub leader explains the format and purpose of hub-led teacher PD.

> *We bring teachers together for what we call unit based PDs, which are full day PDs where teachers come together and reflect on the successes of the previous unit-which they've all taught using roughly the same materials, talk about the challenges of the previous unit, have some sort of experience as learners […]and then they lesson plan together.*

Novel uses an opt-in model for PD. When opting-in to this support, teachers agree to 1) follow the curricular scope and sequence, 2) commit to participation in all PD sessions, and 3) agree to use some of the hub-developed instructional resources/routines. The network sees the opt-in model as critical to building a coalition of willing participants within its PD. One hub leader explains the importance of the opt-in model.

> *The opt-in is really important because our curriculum materials are grounded in a particular pedagogical stance. […] We want teachers to want to do that*.

While the network's opt-in approach helped to establish a coalition of participants that subscribe to the network's vision for instruction, a portion of Novel's schools have not opted-in to receive Novel's PD. As described by one hub leader, *"across all of our PD, we've got nearly 400 teachers and 65 of our 77 schools are participating in at least one."* This suggests a

potential consequence of this approach is uneven distribution of engagement and support across the network.

While the hub supports teachers in designing their own instruction, hub leaders highlight the importance of establishing a set of base-level resources for those participating in its PD. As explained by three hub leaders, without at least a set of common resources for practice there was little to "*organize conversations among teachers".* Apex's instructional resources served to organize a broad frame for instruction that provided the fodder around which teachers collaborated. This suggests that while the network uses an adaptive approach to instruction and instructional improvement, the network found it important to establish a set of common practices in order to engage schools with one another, and with the hub.

More recently, the hub developed PD opportunities for school-level instructional leaders aimed at building leadership' knowledge around the network's educational infrastructure. Instructional leadership PD developed in response to what the hub saw as a challenge in implementing its instructional design. Hub leaders recognized a mismatch between the pedagogical approaches embedded within Novel's curricular resources and divergent conceptions of high-quality instruction and/or initiatives at the school-level. As explained by one network leader:

> *Often what happens is when an AP or a principal doesn't have a clear understanding of our pedagogical approach, we might be setting a teacher up not necessarily for failure but for challenges in their school.*

The initial goal of the hub's instructional leadership PD was to build leaders' knowledge around the substance and intention of network's curricular resources so they could help to support its use in practice. However, this work was complicated by the intricacies of the instructional resources across the content areas. As one hub leader describes, *"[our curricular*

resources] are so subject specific that for a school leader, particularly in our small schools who supervise more than one content area, there isn't coherence across [the content areas]". With many instructional leaders working across multiple content areas, learning about the goals, intentions, and practices embedded within each of the curricula proved to be a complex task for both school leaders and for hub leaders facilitating PD. As a result, instructional leadership PD moved away from building leaders' knowledge around the instructional resources to more general leadership practice supports, such as enacting teacher observation meetings.

Novel organizes instructional leadership PD as a learning series of four sessions over the school year. PD is held at the hub and co-facilitated by hub instructional specialists and data specialists. The hub offers PD to any instructional leader in the network who opts-in to these supports. In some instances, local district superintendents require school instructional leaders to attend the PD.

In addition to hub-led PD sessions, the hub also facilitates inter-visitations for willing instructional leaders. During these inter-visitations, small groups of instructional leaders travel to host schools and observe portions of instructional practice, such as running a teacher post observation meeting. Members of the inter-visitation team then meet together to provide feedback to the instructional leader around their practice, and help the leader plan for future meetings.

Hub leaders acknowledge that instructional leadership PD is an emerging and developing area of support for the network. As explained by hub leaders, they have not yet figured out how to directly support instructional leaders around the network's curriculum materials. Instructional leadership PD remains an area of continual development for Novel.

School-based Support

Novel provides limited school-based coaching supports and no school-based PD for teachers and leaders in the network. Many Novel schools do receive school-based PD and coaching from other district support organizations; however, these supports are not a part of Novel's design for instruction and instructional improvement. This is in contrast to Apex's design that establishes structures for school-based PD and coaching across its networks.

The hub offers instructional coaching to teachers in a few cases of special grant-funded work. One example of this is a history-based writing program that provides instructional coaching to four schools in its network. Previously the hub provided frequent, school-based coaching to support teachers in unit and lesson planning. However, the hub pulled back its coaching structure in favor of developing curricular resources and providing aligned PD. As described by hub leaders, the hub is currently trying to figure out a coaching method that is feasible for the hub to provide and aligned to the network's curricular materials, but no such structure has been developed yet.

The hub provides coaching to instructional leaders in between instructional leadership PD sessions, roughly once or twice per semester. The purpose and focus of this coaching vary by time of year, school, and individual, but common topics addressed include: providing teacher observation feedback, framing team meetings, and using network data tools. Similar to Novel's instructional leadership PD, leadership coaching is not explicitly linked to Novel's educational infrastructure. These sessions often take place virtually on Google Hangout.

Table 5.2: Novel Hub-based and School-based support: Frequency and Total Time

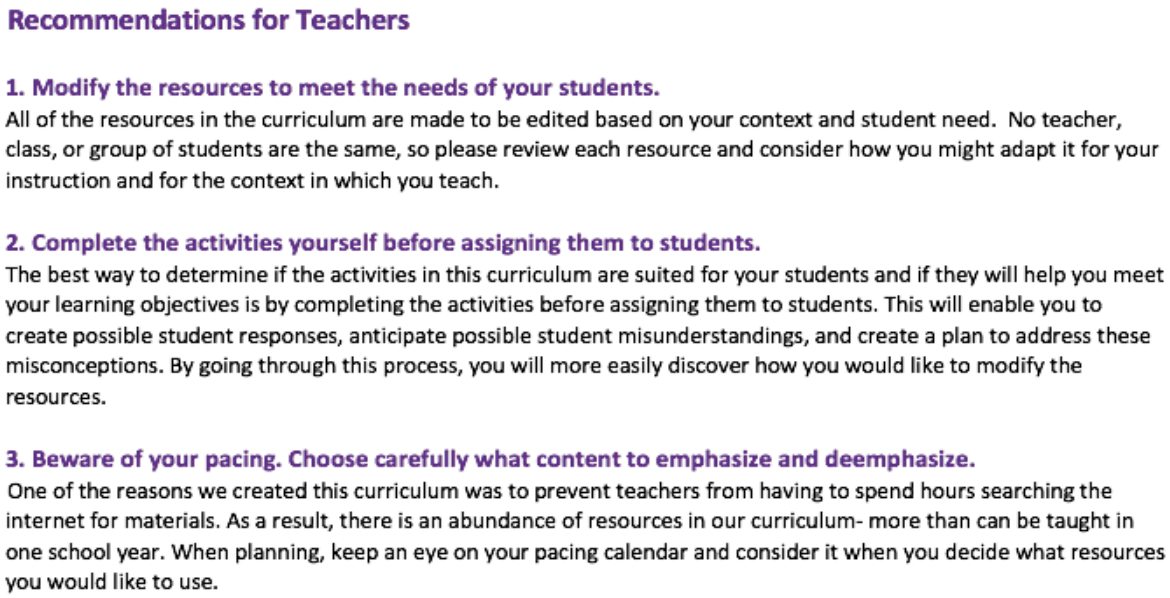
	Teachers	School leaders
Hub-Based Support	~7 sessions/year (~ 56 hours)	4 sessions/year (~32 hours)
School-Based Support	N/A	2 sessions/year (~4 hours)
Total	~56 hours/year	~36 hours/year

Implementation Tools and Guidance

In addition to hub-based and limited school-based PD and coaching, the hub provides a series of tools and guidance to support use of the network's educational infrastructure in practice. Tools and guidance support teachers and school leaders in understanding and using the network's educational infrastructure to meet the needs of their classroom. These tools also function as a way for the hub to support teachers and leaders in using its educational infrastructure despite Novel's limited on-site support. The hub provides two such tools and guidance: content-based user guides and educative curriculum features.

User guides. Content-based user guides are broad, introductory resources practitioners can use to quickly learn about hub-developed curricular resources. User guides describe the organization and structure of the curriculum, and provide an overview of its key features. These guides also include tips for implementation for both teachers and instructional leaders, as well as ideas for modification of the curriculum. Figure 5.5 shows an excerpts of implementation tips that can be found in a Novel user guide.

Figure 5.5: Novel User Guide, Excerpt of Implementation Tips



Recommendations for Teachers

1. Modify the resources to meet the needs of your students.
All of the resources in the curriculum are made to be edited based on your context and student need. No teacher, class, or group of students are the same, so please review each resource and consider how you might adapt it for your instruction and for the context in which you teach.

2. Complete the activities yourself before assigning them to students.
The best way to determine if the activities in this curriculum are suited for your students and if they will help you meet your learning objectives is by completing the activities before assigning them to students. This will enable you to create possible student responses, anticipate possible student misunderstandings, and create a plan to address these misconceptions. By going through this process, you will more easily discover how you would like to modify the resources.

3. Beware of your pacing. Choose carefully what content to emphasize and deemphasize.
One of the reasons we created this curriculum was to prevent teachers from having to spend hours searching the internet for materials. As a result, there is an abundance of resources in our curriculum- more than can be taught in one school year. When planning, keep an eye on your pacing calendar and consider it when you decide what resources you would like to use.

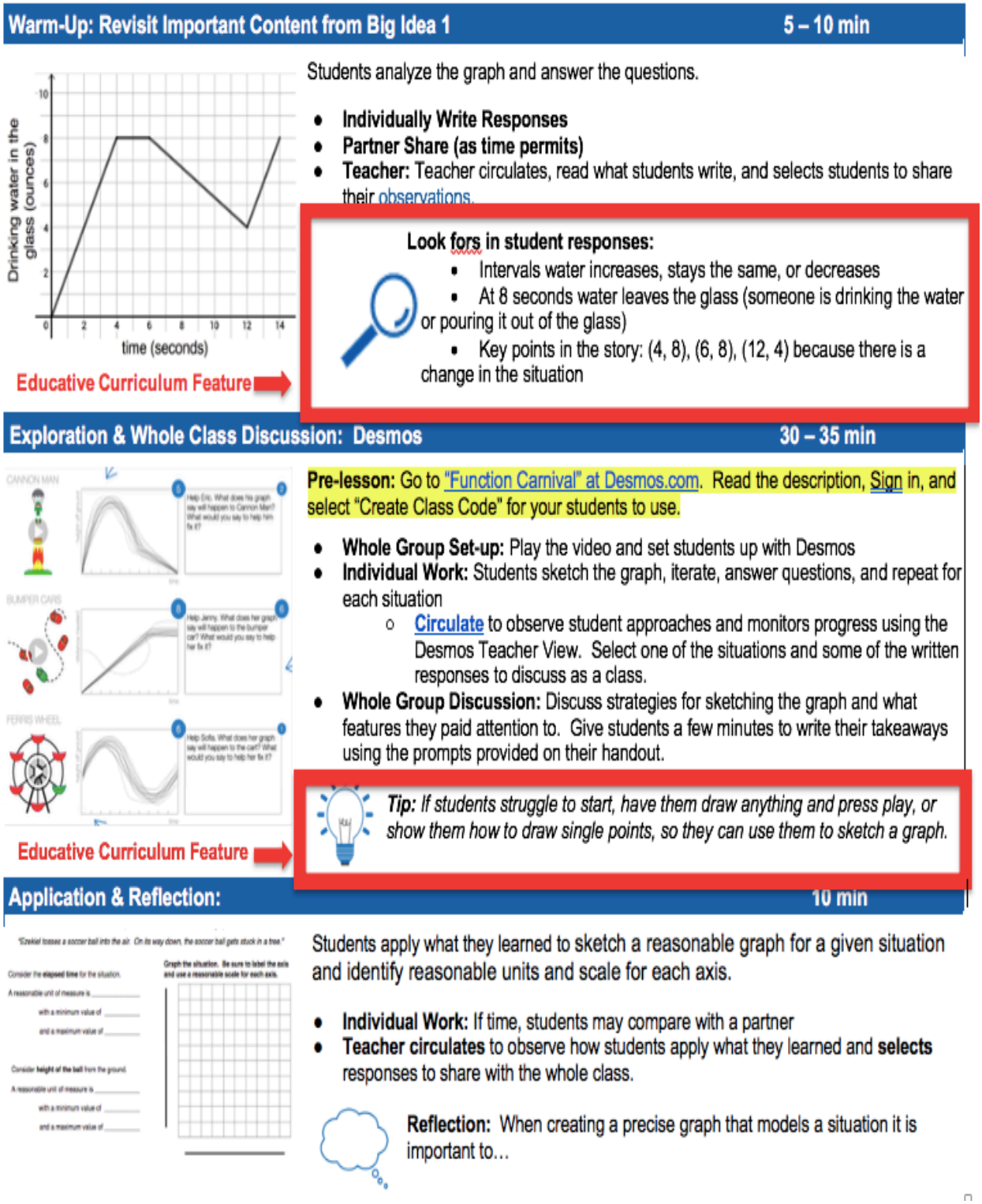
The hub sees these guides as a solution to one of Novel's implementation challenges. Given the hub's limited presence in schools, curriculum user guides function as a way for the hub to support teachers and leaders in using its resources without being on-site. One hub leader explains how user guides support school leaders in implementing Novel's curricular resources in schools.

> *Every year we talk about how to get back into schools to do coaching and I think that would only solve our own problem in that we don't get to see instruction enacted as often as we would like. I don't think it solves a larger problem which is that teachers may not understand the intention of it or administrators might not understand the intention of it or how to use it. To solve that problem, we are starting to develop more resources that are geared towards administrators and instructional leaders and we are trying to supply them with tools they can use to kind of recreate what happens in our PDs in their own schools.*

Educative curriculum materials. By definition, educative curriculum materials are built-in features that help to increase teachers' knowledge in specific instances of instructional decision making, but also help teachers develop more general knowledge that they can apply flexibly in new situations (Davis & Krajcik, 2005). In other words, educative curriculum

materials support teacher learning as well as student learning (Schneider & Krajcik, 2002). The hub is in the process of developing educative curriculum materials to support teachers in using network curricular resources as a means of supporting implementation. Common educative curriculum materials include: potential language and questions to use with students, suggestions for monitoring student progress, and ideas for reflecting upon student work. Figure 5.6 provides a sample of educative curriculum features for Novel's instructional guidance materials.

Figure 5.6: Novel Educative Curriculum Feature Sample



Similar to Novel's user guides, educative curriculum materials serve as a solution to implementation challenges faced by the network. These materials function as a way for the hub to support teachers and leaders in using their resources despite their limited on-site support. In line with network beliefs about adaption of use, these resources provide support for implementation, but ultimately leaves instructional decision-making up to teachers themselves.

Points of Comparison

The networks' designs for supporting the use of educational infrastructure in practice represent different ideas about what supports improvement in practice. Apex supports the use of educational infrastructure in practice by heavily training and coaching network members around said infrastructure using a set of highly-specified routines and resources. The intended product of this design is a version of instruction that is defined by the network. By contrast, Novel supports the use of educational infrastructure in practice by establishing joint work opportunities to support teachers in using network infrastructure to develop adaptive, classroom-level practices. The intended product of this design is a version of instruction that is informed by the network's conception of instruction, but developed by teachers to meet the needs of their classroom. In this section, I compare and contrast each network's designs for supporting the use of educational infrastructure in practice.

Hub-based and School-based Supports

Apex and Novel use hub-based and school-based supports, such as PD and coaching, to support the use of educational infrastructure in practice. The networks differ, however, in how they structure and use these supports to build capacity for instruction and instructional improvement. In Apex, hub-based PD and frequent school-based PD and coaching serve as key levers for implementation of the network's educational infrastructure. Through observable

routines, such as using video exemplars and rehearsals, hub-based PD builds teacher and leader capacity to implement the network's educational infrastructure with fidelity. In particular, hub-based PD provides opportunities for building shared understandings around the network's instructional resources, and for norming practice to that infrastructure.

The hub also organizes broad routines for school-based support for educational infrastructure use. Per the network designs, schools provide weekly school-based PD and coaching around the network's educational infrastructure. Frequent school-based PD and coaching establish ongoing opportunities for teachers and leaders to practice enactment of the network's instructional guidance, and to norm practice to that guidance.

While Apex's uses an overarching fidelity-based approach in its design, its design does show evidence of elements of an adaptive approach at the school-level. Under Apex's design, the hub establishes broad guidelines for PD and coaching (e.g. teachers are coached weekly, focus on arc of the year priorities), but school leaders determine the type of PD and coaching that best serves the needs of their schools. In many cases, school leaders differentiate PD and coaching for individual teachers based on needs. Moreover, there is evidence that schools take on additional priorities separate from hub-developed priorities. For example, one Apex school recently set a school priority for incorporating social-emotional learning into their practice. In support of this priority, the school provides PD and coaching time to support this initiative. As such, this arrangement can be viewed as sort of 'designed discretion'. By that I mean the hub establishes the routines for school-based support (weekly PD and coaching), and intentionally designs for school-based discretion for its implementation. This allows for school leaders to attend to the particular challenges identified at the school-level.[26]

[26] Peurach et al. (2016) refers to this arrangement as formal routines and guidance for adaptive, locally responsive use.

Novel's key lever for implementation is hub-based PD. In contrast to Apex, Novel's PD seeks to support teachers in designing their own instruction. The network does so by creating joint work opportunities for teachers and leaders to collaborate around designing instruction and addressing problems of practice. This design for supporting the use of educational infrastructure in practice underscores the network's adaptive approach to instructional improvement.

While Novel uses an overall adaptive approach to instructional improvement, the network's design for PD shows evidence of fidelity-based elements present in its design. When teachers opt-in to receiving the hub's PD, they agree to a set of conditions. For teachers, this includes following the curricular scopes and sequences and instructional resources. This arrangement suggests elements of fidelity are built into Novel's design for the purposes of supporting their adaptation-based design principle. Following a common scope and sequence and using network instructional resources ensured teachers were teaching roughly the same thing at the same time, and with a common set of materials. This baseline practice helped to establish a shared frame for instruction that enabled teachers to work together jointly to design instruction.[27]

Despite differences in hub-based and school-based supports, curricular resources proved to be essential to facilitating PD and coaching in both networks. Each network intentionally built its PD and coaching around the use of instructional guidance. For Apex, PD and coaching focused on understanding, using, and norming on the network's instructional resources. For Novel, teacher PD focused on adapting network instructional resources for classroom use. This underscores the central role of educational infrastructure in grounding Apex's and Novel's work with schools.

[27] Peurach et al. (2016) refers to this as creating formal, codified resources for creating base-level practices and understandings.

Implementation Tools and Guidance

Both Apex and Novel utilized a set of implementation tools and guidance to support practitioners in using educational infrastructure in practice. However, the networks did so in ways that reflected each network's underlying fidelity/adaptive approach to implementation. For Apex, instructional tools and guidance established a set of highly-specified routines and resources to support teachers and leaders in using the network's educational infrastructure with fidelity. In contrast, Novel's implementation tools and guidance supported teachers in their own instructional design. For example, educative curriculum materials provided additional guidance for implementation teachers could use when designing instruction.

In both cases, use of implementation tools and guidance functioned as solutions to particular implementation challenges faced by each network. In creating highly-specified routines and resources for implementation, Apex was able to direct how teachers and leaders interact around network instructional guidance during PD and coaching sessions. This helped to address a key implementation challenge identified by the network, that is maintaining a high level of rigor in instruction. Establishing procedures and routines to support teachers in upholding network intended use of instructional resources is what the network saw as leading to high-quality, rigorous instruction. Novel faced a different implementation challenge, that is supporting teachers in using its curricular resources at the school site. To remedy this challenge, Novel established a set of implementation tools and guidance that could support on-site use in the absence of network presence in schools.

Role of Network Dimensions

As described previously, Apex and Novel are different types of networks, varied in network structure, governance, composition, and purpose. These differences in network

dimensions help to explain major distinctions in their designs for supporting educational infrastructure use in practice. In the case of Apex, the designs for supporting infrastructure use is shaped by the network's centralized structure, governance over instructional decision-making, homogenous network composition, and focus on network-wide scale-up. In the case of Novel, by contrast, the designs for infrastructure use are shaped by the network's decentralized structure, limited governance over instructional decision-making, heterogenous network composition, and focus on building a system of supports. In this section, I present on how network dimensions help to explain differences in Apex's and Novel's design.

Network Structure and Governance

Differences in network type help to explain distinctions between Apex's and Novel's designs for supporting educational infrastructure use in practice. Apex's highly centralized structure and formal authority over member schools establishes the conditions for a fidelity-based approach to supporting the use of educational infrastructure in practice. In contrast, Novel's more decentralized structure with limited authority over member schools establishes the conditions for a more adaptive approach.

Apex is structured as a strong central hub with formal authority over member schools. As established under its management contract, Apex's hub is responsible for instructional design in the network. With this formal authority over instructional design, the hub establishes a set of common practices used across the network that supports the faithful use of the network's instructional guidance. These practices include providing weekly school-based PD and coaching focused on understanding, practicing, and norming on the network's educational infrastructure. It also includes requiring the use of hub-developed routines and guidance, such as the arc of the year and IPP, to support faithful use.

In establishing these common practices, the hub is able to leverage its hierarchical structure to provide frequent, site-based support. Per the network's design, both regional superintendents and school leaders provide direct, on-site support for implementation in schools. This included frequent, on-site PD and coaching for both teachers and leaders. Under this arrangement, the hub established highly-specified guidance and routines for site-based support, but relied on regional superintendents and school leaders to provide the day-to-day support to teachers and instructional leaders.

In contrast, Novel is an external service provider with a decentralized structure and limited authority over schools in its network. Unlike Apex, Novel cannot make instructional mandates on schools, nor require schools to utilize network supports. Instead, Novel relies on an 'opt-in' structure in its design. The network seeks to encourage opt-in by creating what the hub sees as high-quality instructional resources, and providing PD support around those resources.

Moreover, the hub cannot establish structures for school-based PD and coaching, as is the case with Apex. Instead, Novel focuses its supports mainly on direct hub-to-teacher support and hub-to leader support. This support is less frequent than that of Apex and is mostly not site-based. Hub leaders expressed a need to provide more on-site support to help with implementation. However, given the hub's current capacity it is unable to provide direct support to schools. The hub is trying to develop school leaders' capacity to support teachers on-site through the context of its PD for instructional leaders, however, this remains a developing area of support for the network.

Network Composition

The networks' composition of schools also helps explain differences in approaches to supporting educational infrastructure use across the networks. Apex serves a more homogenous

population of schools, with member schools located in areas with relatively similar contexts and student demographics. Apex's more homogeneous composition suggests that centrally-built network supports might serve to address common challenges seen across the network. In contrast, Novel serves a more heterogeneous population of schools that vary across a range of dimensions, including location, size, socioeconomic status, and achievement. Novel's work with a more diverse composition of schools suggests a wider variation in school needs. This underscores the network's need to support schools in designing practices most useful for their particular schools and students.

Purpose

Fundamental differences in the purpose of these networks also serves to explain network approaches to supporting educational infrastructure use in practice. As a developed network that has engaged in the work of instruction and instructional improvement for 20 years, Apex is no longer building a network design, but focusing on refining and replicating that design as they scale-up the network. Apex's highly-specified set of routines and resources for supporting the use of educational infrastructure in practice provide practical guidance schools can use to quickly begin carrying out Apex's instructional design in new contexts. Replication of this vetted design allows the network to scale-up with some level of reliability.

Novel is comparatively newer to the work of instructional improvement. The network is not focused on replicating a model. Rather, Novel is focused on building a program to support a diverse set of schools. This is evidenced by the network's recent shift to supporting teachers in using hub-developed curricular resources, and providing instructional support for school leaders. Given its more recent development, Novel's design and practices have not been vetted as is the case in Apex. Novel is also not seeking to replicate and scale-up in the same way. In part, this

explains Novel's less comprehensive set of implementation supports, particularly its limited mechanisms for supporting educational infrastructure use at the school-site.

Discussion

In this chapter, I have presented the networks' designs for supporting the use of educational infrastructure in practice. I find that a key distinction lies in the relationship between (a) the set of mechanisms used by the network to support implementation and (b) the intended product of their design. Apex supports the use of educational infrastructure in practice by heavily training and coaching network members around said infrastructure using highly-specified routines and resources. Apex's centralized structure, governance over instructional decision-making, homogenous network composition, and focus on network-wide scale-up helps to explain this design for support. By contrast, Novel supports the use of educational infrastructure in practice by establishing joint work opportunities to help teachers use said infrastructure to develop adaptive, classroom-level practices. Novel's decentralized structure, limited governance over instructional decision-making, heterogenous network composition, and focus on building a system of supports helps to explain this design.

This analysis raises several points of consideration about network designs for supporting educational infrastructure use in practice. One such consideration is the relationship between network structure and points of leverage for implementation support. As a centralized network, Apex was able to leverage both regional superintendents and school leaders to provide direct, on-site support for implementation in schools. This included frequent, on-site PD and coaching for both teachers and leaders that allowed for ongoing support around infrastructure use. On the other hand, Novel's decentralized and flatter organizational structure made it necessary for the hub to work more directly with teachers and instructional leaders around implementation. Given

Novel's position as an external support provider with limited authority over member schools, the hub was not able to enlist school leaders to provide on-site support for implementation in the same way. This underscores the role of network structure and governance in establishing particular conditions that shape network designs for supporting implementation.

Another point of consideration involves the nuanced relationship between fidelity and adaptation in supporting implementation. As described, Apex's and Novel's designs held true to an overarching design principle of each network. However, analyzing the networks' designs uncovered that each network utilized the alternate approach in nuanced ways. For instance, Apex relied on school-level adaptation of PD and coaching practices by school leaders to meet individual school needs. Novel, on the other hand, established a set of baseline practices for teachers opting-in to PD in order to engage teachers in substantive joint work opportunities. This suggests that although networks might ascribe to certain overarching design principles in their designs for instruction and instructional improvement, the networks may utilize alternate design principles in more nuanced ways.

While this chapter raises important considerations about network designs for supporting educational infrastructure use in practice, analyzing this domain of activity does not provide a comprehensive account of network designs for instructional improvement. To more fully understand network designs for instructional improvement we need to know more about how these networks manage performance in their network, and how network dimensions potentially explain this work. The next chapter describes network designs for performance management, identifies critical similarities and differences across networks, and analyzes how network dimensions help to explains those designs.

CHAPTER 6

Findings: Managing Performance

In this third findings chapter, I examine network designs for managing performance, and I explore how network structure, governance, composition, and purpose shape and influence these designs. I do this in three steps. I begin by describing each network's design for managing performance, with a focus on designs for managing accountability and managing continuous improvement. I then compare network designs to identify key points of similarity and difference between designs. Finally, I describe how network structure, governance, composition, and purpose, help to explain major distinctions in network design.

As described in Chapter Two, managing for accountability refers to the use of evidence and standards to assess instructional processes and outcomes with the primary aims of evaluating the work of students and teachers in relation to expectations for their performance. Managing for continuous improvement refers to the ongoing refinement of instructional visions/designs, infrastructure, and supports for use in response to evidence of problems in achieving the core goals and purposes of the design.

As described by Supovitz (2009), dynamic learning processes needed for continuous improvement include four key elements: 1) *data capture* where organizational members decide what data are related to the organization's core processes important for them to investigate and capture; 2) *meaning making* where data are interpreted and converted into information; 3) *information sharing* processes where data are shared across the organization, and 4) *embedding*

learning which includes the formal ways organizations utilize newly gained knowledge by building said knowledge into the regular processes of the organization (2009, p. 710). I use the four mechanisms outline by Supovitz (2009) to describe each network's design for continuous improvement in this chapter.

In analyzing the designs, the key point of differentiation lies in the varying intentions for managing performance in each network. Apex shows evidence of a highly-specified and intentional design for managing for both accountability and for continuous improvement. This suggests the hub sees both domains as key facets of hub activity. The network's centralized structure, governance over member schools, and focus on network-wide scale-up helps to explain these designs. Novel shows evidence of a less specified and less intentional design for managing for accountability and for continuous improvement. The network does not view managing for accountability as a key facet of hub activity. The network's decentralized structure, limited governance over member schools, and focus on developing a system of supports helps to explain these designs.

The preceding, in turns, suggests two key points for consideration in network designs for managing performance: 1) one point for consideration involves the relationship between managing for accountability and the networks' capacity for continuous improvement; 2) another point of consideration involves the relationship between network type and hub beliefs about its role in managing performance.

The Case of Apex

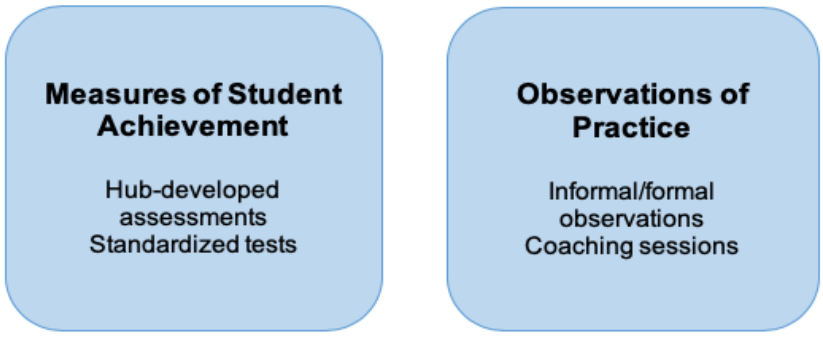
Apex shows evidence of a highly-specified and intentional design for managing for both accountability and continuous improvement. The network's intentional design for managing for both purposes suggests the hub sees each domain as key facets of hub activity. In this section, I

describe Apex's highly-specified designs for managing for accountability and continuous improvement.

Managing for Accountability

Apex uses two main mechanisms for managing for accountability: measures of student achievement and observations of practice. These mechanisms support the network in (a) keeping close, ongoing oversight of school-based instructional practice and (b) measuring effectiveness of its instructional design.

Figure 6.1: Apex's Mechanisms for Managing for Accountability



Measures of student achievement. Built into Apex's curricular resources are a series of assessments to measure student achievement on instructional objectives. Assessments include weekly quizzes and unit-based interim assessments aligned directly to the hub's curricular resources and to the common core standards. The assessments are given to all students in the network. These measures of student achievement help the network to closely monitor progress at the school, teacher, and student level. For example, as described by one network leader:

> *Students take a weekly quiz. I can go onto our tableau reporting tool and I can identify the standards aligned to each question type, the percentage of kids that mastered that standard and that question-type and how that compared to the other schools across [Apex].*

Hub leaders, school leaders, and teachers use these assessments to actively monitor student achievement on network and school goals. The assessments also help the hub and school leaders make decisions about teacher supports. For instance, one principal describes his use of student achievement measures to identify targeted areas for improvement.

> *I know right now we are off vision. I'm spending a ton more time with my regional superintendent and meeting with my academic dean just to look at it. That's because we have really, really strong data structures that tell us where kids are on a weekly level.*

The network also tracks annual, standardized measures of student achievement, such as the New York State Regents exams and Advanced Placement exams. These standardized tests serve as key markers of overall network performance used by the hub to monitor progress toward network-wide instructional goals. For example, a key portion of the summer leadership PD was spent sharing school pass rates on advanced placement exams and communicating test achievement goals for the coming school year. The network tracks school-level performance on these measures annually. Hub leaders use this information to tailor supports to individual schools, such as targeted coaching by regional superintendents.

Observations of practice. In addition to ongoing monitoring of student achievement, Apex organizes frequent observations of practice for both teachers and school leaders. This includes formal and informal teaching and leadership observations. Academic deans and principals observe teacher instruction once a week. As explained by one school principal, school leaders align these observations to the network-wide objectives identified in the arc of the year and other school-level priorities.

School leaders also see practice during rehearsals conducted in coaching sessions. Similar to the network's measures of student achievement, Apex uses observations of practice to monitor

instruction, and to make decisions about teacher supports. For example, one school leader describes how they use observations and other data to differentiate support for teachers.

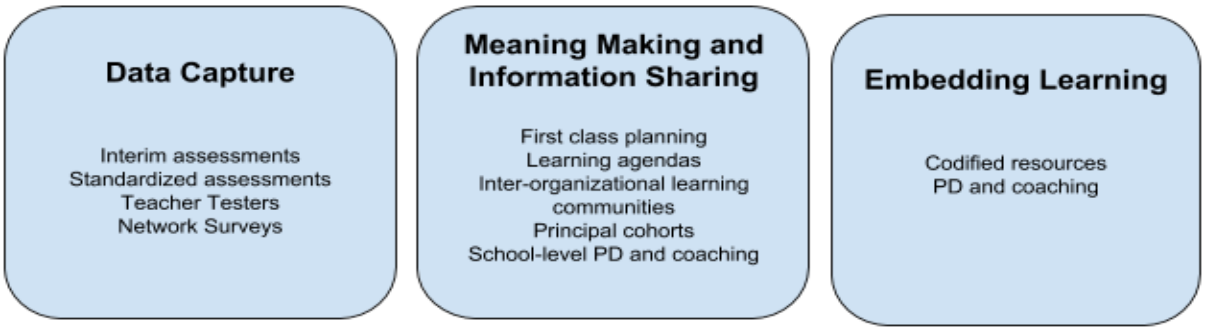
> *We very much differentiate based on what we're seeing in the gaps and the extent to which the teachers are on or off vision in their data and in the walkthroughs. There are some teachers that are meeting daily with the deans for feedback, practice, and scrimmaging, and there are other teachers that in terms of formal meetings are every other week in terms of what we're seeing in the data and their overall performance.*

The hub observes and evaluates school leaders twice a year on what the hub identifies as "power skills", or key leadership skills and practices promoted by the network. As described by hub leaders, during these observations school leaders enact practice-based scenarios in front of hub leaders who evaluate their performance.

Managing for Continuous Improvement

Apex's design goes beyond managing for accountability to include processes for continuous improvement. Continuous improvement goes beyond holding members accountable for implementing the network's instructional design and measuring design effectiveness, and moves to identifying problems of practice and refining the instructional design in response. Apex's design shows evidence of using a set of highly-specified mechanisms for data capture, meaning making, information sharing, and embedding learning. These mechanisms support the network in (a) understanding practice, (b) learning from it, and (c) refining its instructional design in response.

Figure 6.2: Apex's Mechanisms for Managing for Continuous Improvement



Data capture. As described in the previous section, the network uses two different types of evidence to monitor implementation and effectiveness of the network's instructional design: measures of student achievement and evidence of practice. These features also function as mechanisms for data capture that help the hub to surface knowledge about implementation that is used to improve the network's instructional design. For example, capturing student achievement on interim assessments allows the network to identify areas of variation across the network. Observations of practice support the network in identifying areas of variation in practice within schools. In addition to these sources of evidence, Apex also uses other mechanisms to capture key data about its instructional design. These other mechanisms include: teacher testers, PD and coaching sessions, and network surveys.

Teacher testers. The network uses classroom teacher testers to gather feedback on hub-developed instructional resources. A teacher tester is a stipend position where a teacher implements, records, and provides feedback on curricular materials to the network. Teacher testers typically video record a lesson using the hub-developed curricular materials. Teacher testers send the video to the hub Achievement Director weekly. During a debrief, the Achievement Director gives feedback to the teacher on their implementation of the lesson, and the teacher provides feedback on the construction and ease of implementation of the materials.

The hub then *"tries to strategize and think about what is our learning from this and how do we want to codify it and share it and distribute it".* Teacher testers tend to be high performing teachers as identified by the network's teacher evaluation framework.

PD and coaching sessions. PD and coaching sessions for both teachers and school leaders provide opportunities for practitioners to share information about practice with others in the network. These sessions aim to surface and communicate problems of practice at the school level. For school leaders, principal cohort meetings and coaching meetings with regional superintendents provide a space for, among other things, sharing knowledge about school-level practice with the hub. For example, as one school leader describes, *"I think the network collaboration happens where they ask for our feedback at the end of a unit, and then they use that feedback to inform revisions for next year."* Teacher level PD and coaching sessions provide similar opportunities for teachers to share feedback about practice with principals and academic deans around classroom practice.

Network surveys. The network uses a series of surveys to gather information about critical components of the network's instructional design across various stakeholders in the network. In particular, the network surveys teachers on the effectiveness of network curricular resources at various increments over the year. These surveys ask teachers to rate their satisfaction with the materials, the rigor of the resources, and the clarity of lesson plans. The network also surveys students and parents about their satisfaction with individual schools and teachers, as well as surveys all Apex staff on the organizational health of the network as a whole.

Meaning making and information sharing. Apex establishes a set of processes to facilitate meaning making around data captured across the network. These processes range from explicit processes organizing members' interactions with network data, to more loosely

organized communities of practice. Established processes for meaning making also serve as key mechanisms for information sharing across the network. Mechanisms for meaning making and information sharing include: first class planning, learning agendas, interorganizational learning communities, principal cohorts, and school-level coaching and PD.

First class planning. Apex uses a highly-specified organizational planning process to make sense of critical network data, and to establish yearly achievement goals. Through this process, hub leaders analyze key data, such as interim assessments and other achievement measures, to establish network-level achievement goals for the upcoming academic year. The hub also identifies key levers of network support needed to meet established goals. Levers of network support include *"PD and all the other levers that we use"* such as the network's educational infrastructure and changes to school-based supports. Through this process, the hub identifies deliverables to produce in order to meet the identified goals. Hub leaders develop the first-class plan and regional superintendents and school leaders provide feedback on the plan. The plan is formally communicated to school leaders and teachers during summer PD, and through organizational documents disseminated across the network.

Figure 6.3: Apex First Class Plan Template, Excerpt

17-18 HIGH SCHOOL HISTORY: Teaching & Learning Deliverables & Support

I. Achievement Goals

Current Achievement (Draft until EOY data comes in- could name what we think is up, flat, down based on IAs)	**Achievement Goals for 17-18**
Based on IA's, AP achievement is looking up School A, flat at School B, and down at School C and D.	**≥ 30% of all AP test-takers in the network earn 3 or higher** **For cohorts (course at one school)** **with 2017 results** / **2018 Goal** / **Example** Below 20% pass / 100% improvement / 10% pass → 20% pass 20%-40% pass / 50% improvement / 30% pass → 45% pass Over 40% pass / 20% improvement / 50% pass → 60% pass

II. Key Levers/Priorities for Team

Key Levers we believe will drive achievement in 17-18

Key Lever	Metrics	Key Sub-Tactics	Owner
Daily Lesson Resources: G9 and G10	- 85% teachers & leaders agree/strong agree "The resources ...rigorous instruction." - Posted on Time - Consistently scoring 3+ on monthly scoring via the team's rigor rubric	- Build G9 and G11 DLR - Revise Unit Overviews for G10 - Teacher –tester monthly cycle - IPP structures and support via summer PD and cohort AOTY PD	Owner A Owner B
Strong LASW Exemplars & Training	- 75% Academic Deans earn 3 or 4 on LASW triathlon by Feb. - 100% of Deans conduct LASW at least weekly with with every history teacher by Week 8.	- 101 Training aligned to Relay rubric for ADs and Principals (Team Super) - Monthly shared assessments for G11 and 45 min LASW calls with Deans (Owner A) - G9 and G11 daily exemplars in DLR - G9 Unit Test and IA LASW webex for G9 teachers and HS deans (Owner B) - RSs report in monthly about frequency of LASW at their schools	
Crescendo Resources	- 100% of AP history teachers begin Independent Review plan on time - Posted on Time	- Integrate AP Independent Review into DLR in G11, including weekly quizzing starting in Jan (Owner A) - Take G11 Unit 4A daily instructional guidance from current level of specificity to DLR-level (produce practice assessments, instead of providing banks, etc.) (Owner A) - Make explicit recommendations for content and timing of AP Independent Review in G10 in December (Owner B) - Revise G10 Unit 4A and Crescendo materials for full alignment to APWH revision (Mallory)	Owner A Owner B
Content Guidance aligned to AOTY	- 90% leader PD participants agree/strongly agree sessions are high impact	- History AOTY PD design, execution, and follow-up (Brenda)	Brenda

Learning agendas. Following the release of state standardized tests results at the beginning of each school year, hub leaders spend four weeks conducting what the network calls learning agendas. During this process, the network identifies high-performing schools and teachers as identified by state standardized test scores and studies their performance. They do this by interviewing their highest performing teachers, videotaping their practice, and using this information to codify practices and to refine instructional resources. As explained by one network leader:

> *We look at the data and we look who is doing really well, both inside our organization and outside, and revise our first class plan. Who do we want to go and talk to inside our network? Who do we really need to learn from and codify and share out? Who from outside of our network do we need to look at and learn from? What are other questions we have that we are not sure about that we need to chew on some more?*

Inter-organizational learning community. The hub also looks outside its network to other CMOs to learn from their work. The network leads and participates in an inter-organizational learning community focused on sharing best practices and navigating challenges facing CMOs. Hub leaders point to this as a means of exploring new practices that could be beneficial to the network. For example, a hub leader explains plans to implement a new practice used by another CMO.

> *The thing for next year is actually a best practice learned from [another CMO]. We are going to pull together our 8-10 best teachers five times throughout the school year and the main objectives are to watch video, reflect on the video, and try to capture highest quality video we can so we can distribute it and use it for training […].*

Principal cohorts. Monthly principal cohort meetings provide opportunities for school leaders, in collaboration with regional superintendents, to process data around student achievement results, and to share knowledge across various levels of the network. In these sessions, regional superintendents and principals consult internal and external data, and establish processes for improving practice based upon that data. For example, in one session principals explored data on implementation of the network arc of the year, and set priorities for future school-based PD.

These sessions also serve as a key source of information sharing from the hub to schools, and from the schools to the hub. As described by school principals and regional superintendents, principal cohort meetings provide opportunities for the hub *"to inform school leaders of changes made to instructional resources"*. It also provides a space for school leaders to share school-specific information with the hub, such as school-level problems of practice.

School-level coaching and PD. PD and coaching sessions provide opportunities for information processing for teachers. Following each interim assessment, deans provide one-on-one coaching sessions that focus on analysis of student data. In these sessions, teachers and deans analyze assessment results, and set goals for practice and student achievement. School-level coaching and PD sessions provide opportunities for school leaders to disseminate information coming from the hub to teachers, while also providing a space for teachers to share classroom-specific information with leaders, such as classroom-level problems of practice.

Embedding Learning

Critical to actualizing learning generated in the network is an organization's ability to embed this learning into its instructional design. Embedding learning involves creating tangible resources and/or processes that build this learning into the organization's memory. This allows the network to retrieve and spread learning across the network in the effort to refine how practitioners conduct their work. Apex embeds learning through codified resources and processes for PD and coaching.

Codified resources. At the hub level, learning is embedded within network-developed codified resources. Curricular resources, protocols, and other tools used across the network serve as intentional byproducts of organizational learning used to actualize knowledge throughout the network. For example, in response to measures of achievement as identified on interim assessments and through feedback provided by school leaders to the hub, the network made a range of refinements to their curricular resources. This included adding exemplars of practice to the curricular materials.

PD and coaching. New knowledge is also embedded and implemented through school-level instructional improvement processes, such as refinements to school-based coaching and

PD. In response to school-level data on student achievement and observations of practice, schools refine their coaching and PD focus to support school needs. As described by a school principal:

> *We try to prioritize what are the key drivers that are going to lead to stronger outcomes in terms of teacher development support. That's often driven by the data that we're seeing in the weekly quizzes and the interim assessment cycles. If a teacher's off-track, that might mean daily real-time coaching, that might be actual co-teaching with the dean in the room.*

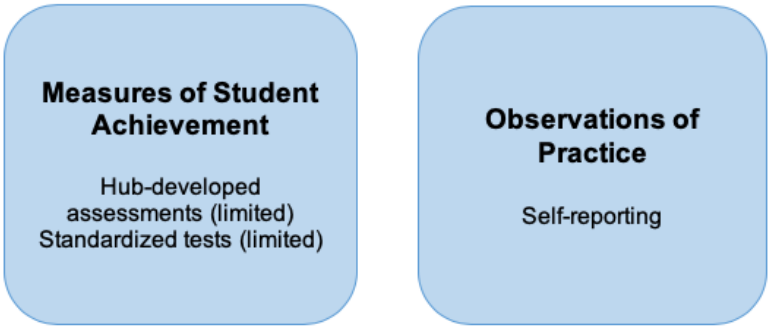
The Case of Novel

Novel shows evidence of a less specified and less intentional design for managing for accountability and continuous improvement. While the hub shows some evidence of managing for continuous improvement, the hub does not view managing for accountability as a key facet of hub activity. In this section, I describe Novel's less-specified designs for managing for accountability and continuous improvement.

Managing for Accountability

Novel uses two main mechanisms to manage implementation of its instructional design: 1) measures of student achievement and 2) observations of practice. However, given the inconsistency in access to measures of student achievement and observations of practice, the network has limited means to measure effectiveness of their instructional design. Hub members also explain that managing for accountability is not a core focus of their work.

Figure 6.4: Novel's Mechanisms for Managing for Accountability



Measures of student achievement. Built into Novel's curriculum materials are formative and summative assessments aligned to the network instructional resources and to the common core standards. Similar to Novel's instructional materials, teachers choose to use and adapt these assessments to suit the needs of their classrooms. There are no formal requirements for teachers use these assessments in practice, nor formal mechanisms to gather assessment results. Rather, Novel relies on teachers to share this data with the hub during PD sessions. Hub leaders explain the challenges they face in gathering this information. As described by one hub leader, *"as the year goes on, we find fewer and fewer teachers using the data tools"*. Waning participation in assessment use over time, and adaptation of the formative and summative assessments used by teachers, complicates the hub's ability to systematically monitor student achievement.

Novel seeks to monitor standardized assessments, like the New York State Regents tests. However, given the network's position as an external support provider, gaining access to that achievement data can be difficult. As explained by one hub leader:

> *We actually don't have the ability to get teacher-level data on assessments so the best that we could get is school level data on a particular Regents, but even that is contingent on our partnership with the department of education.*

Hub leaders also explain that the hub does not see monitoring performance as a key function of hub activity. As one hub leader explains:

> *I wouldn't say we monitor schools, but we monitor effectiveness of our work. […] It's not about trying to rank the schools or anything like that. So that's why saying we monitor schools isn't quite right, but we monitor effectiveness of our project.*

Measures of practice. The network does not formally observe practice. Instead the hub gathers teacher feedback within the context of PD sessions to learn about practice. One way the hub does this is by intentionally soliciting feedback using a set of routines designed to uncover teachers' experiences using Novel resources in their classroom. For example, the network's history PD frequently incorporates a storytelling protocol to learn about experiences in the previous unit. As explained by one hub instructional leader:

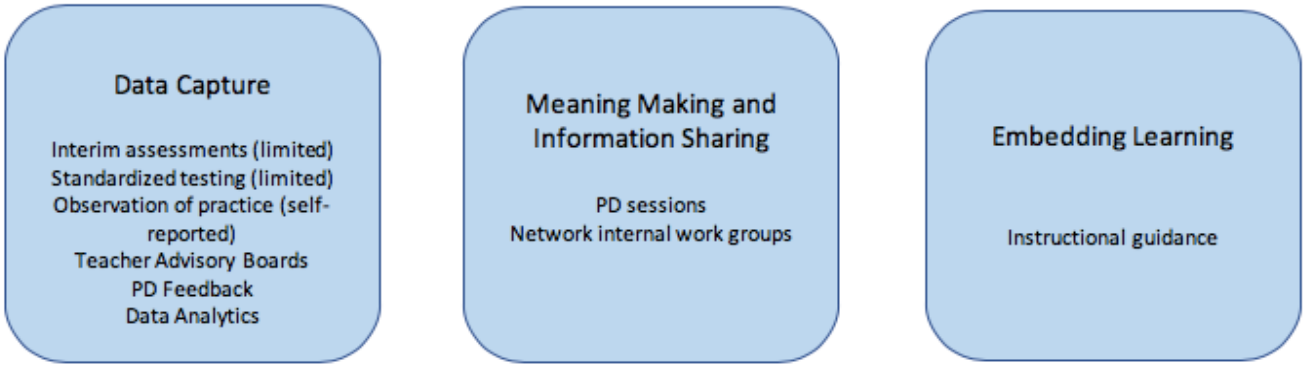
> *We incorporate into our unit-based PDs either a storytelling protocol or some kind of reflection where teachers talk about what has happened in the unit prior. […] That's a really good way of creating common knowledge, but also getting feedback for us in terms of what they are using and how they are adapting what they are using.*

As described by hub leaders, content specialists use this feedback to make changes to hub-developed curricular resources, however it is unclear if the hub uses established, routines or processes to guide this process.

Managing for Continuous Improvement

Novel's design shows more limited capacity for managing for continuous improvement. Although Novel utilizes some mechanisms for data capture, meaning making, information sharing, and embedding learning for continuous improvement, these mechanisms and their use are comparatively less developed than that of Apex. Underdeveloped mechanisms for continuous improvement limits Novel's ability to continually refine its instructional design in response to network learning.

Figure 6.5: Novel Mechanisms for Managing for Continuous Improvement



Data capture. As described in the previous section, Novel uses different types of evidence to monitor implementation and effectiveness of the network's instructional design, including measures of student achievement and evidence of practice. Although these mechanisms provide only limited data on student achievement and practice given the inconsistency of data captured, these mechanisms do, in part, surface some knowledge about implementation of Novel's instructional design. As such, these mechanisms serve as key points of data capture for the network.

In addition to the aforementioned measures of student achievement and measures of practice, Novel uses three additional sources of evidence to capture data about its instructional design: teacher advisory boards, PD feedback, and data analytics.

Teacher advisory boards. Novel uses a teacher advisory board in each content area to provide feedback to the hub on its instructional guidance and supports. Comprised of a diverse set of teachers and leaders, including experienced and less experienced teachers, instructional leaders, and special education teachers from across the city, the board meets with the hub monthly to provide feedback. As described by hub leaders, the teacher advisory boards serve as a valuable source of information the hub uses to make changes to its curricular resources and

design. As described by one hub leader, "*They played the most important role. They are our thought partners that are connected to schools... more connected than we are".*

PD feedback. Another way Novel gathers feedback is through end of PD session surveys on the effectiveness of the session and overall satisfaction with network instructional resources. These surveys seek to identify practitioners' overall satisfaction with PD sessions, relevancy of sessions to daily practice, suggestions for improvement, satisfaction with curricular resources, and likelihood of resource use.

Data analytics. The hub actively monitors curricular website traffic to track how many users access its materials, and to identify which resources are more frequently accessed. This gives the hub a sense of those resources most useful to teachers. Hub leaders described that monitoring network website traffic is one way to address a key challenge identified by the hub. That is how to capture implementation data across schools when the hub is not present in schools. One hub leader explains this challenge:

> *One of the things that we've struggled with the most is actually thinking about how to capture implementation because we don't want to create something that is onerous for teachers and/or that creates data that we simply aren't going to look at. One of the things we have been looking at is clicks on our website. We can actually see what are the resources teachers are clicking on and that gives us a sense of what they are using more.*

Meaning making and information sharing. The hub establishes some opportunities for facilitating meaning making around data captured across the network. These include PD sessions and hub internal work groups. PD sessions serve as the central arrangement for practitioner meaning making and information sharing between the hub and member schools. Hub internal work groups reflect a new, developing context for meaning making and information sharing in the network.

PD sessions. Teacher and leader PD sessions serve as the main context for disseminating knowledge across the network, and for supporting teachers in making sense of data captured. PD sessions provide opportunities for the hub to share key messages with teachers, such as changes to instructional materials, and provides opportunities for teachers to share knowledge with their colleagues around problems of practice.

For example, in the Global History summer PD sessions, the hub organized time to explain major shifts in its curricular resources in response to changes in the state Global History Regents test. The hub also facilitated cross-school work time where teachers collaborated to plan for implementation of network instructional resources. PD also provides time and space for teachers to make sense of student work and assessment results, and organizes opportunities for teachers to provide feedback to hub leaders around implementation of instructional materials.

Hub internal work groups. The hub recently organized its curriculum and instruction department into three cross-content work groups focused on improving key components of its instructional design: PD, curriculum, and instructional leadership. The purpose of these groups was to share best practices across content areas in the effort to improve its work.

At the time of this study, these internal work groups were recently established. Through the course of the academic year, challenges emerged in the productiveness of these teams. As one hub leader explains, *"To be totally transparent, originally, he intended for the three groups to share best practices around those specific areas: PD, curriculum, and leadership. But groups have struggled to actually share that, come to coherence, and design something."* Hub leaders acknowledge that the internal work groups are still developing its purpose and function, but offer potential for helping the hub to make improvements to its instructional design.

Embedding learning. Novel's main mechanism for embedding learning in its instructional design is through modification of network instructional guidance, namely its curricular materials and PD content. As described by several hub leaders, content specialists use feedback from PD sessions and teacher testers to make improvements to the curricular resources and to the substance of PD sessions. Typical modifications of instructional guidance include: modifying lesson activities and modifying PD activities and structures. Refinements to curricular resources are then disseminated to the school-level through PD sessions with teachers.

Points of Comparison

Apex and Novel have varying intentions and capacities for managing accountability and continuous improvement. Apex shows evidence of capabilities for both types of performance management, suggesting the hub sees both domains as key facets of hub activity. Novel shows evidence of less robust capabilities for managing accountability and continuous improvement. The hub does not see monitoring for accountability as a key facet of hub activity. In this section, I compare and contrast each network's designs for managing performance.

Managing for Accountability

Apex and Novel show varying intentions and capacities for managing for accountability. Apex's design shows evidence of robust capabilities for monitoring student achievement and practice in order to hold schools accountable for faithful implementation of its instructional design, and for student achievement. In contrast, Novel's design uses comparatively less robust indicators of student achievement and practice, and does not seek to hold schools accountable for implementation or student achievement. Rather, the hub monitors student achievement and practice in order to gather feedback around its instructional resources.

Apex's design for managing for accountability supports the network's fidelity-based approach to instructional improvement. Central to this design is Apex's set of robust indicators of practice and student achievement that closely align to the network instructional guidance. Apex uses these indicators to directly measure implementation of the network's instructional guidance. For example, interim assessments track student progress on key objectives and skills identified in curricular resources. Classroom observations focus specifically on targeted aspects of instructional guidance implementation. The close alignment of monitoring mechanisms to Apex's instructional guidance incentivizes practitioner use of these resources. In doing so, Apex couples the work of teaching and learning established through instructional resources to developed indicators of performance. This holds practitioners accountable for instructional resource use, and promotes a faithful implementation of instructional guidance by directly measuring resource use.

Beyond incentivizing the use of network-developed instructional guidance, Apex's design for managing accountability provides frequent data on performance that the network uses to identify variation in practice across the network. For example, analysis of middle school history assessments surfaced that the network was off vision in this area. The hub responded by providing additional coaching and PD to teachers in the attempt to move practice closer to the hub-developed conception of instruction. In this regard, Apex used monitoring mechanisms to not only track performance, but to further support instructional guidance use in ways that reflected a more faithful implementation of instructional guidance.

Novel's design for managing accountability reflects the network's commitment to a more adaptive approach to instructional improvement. In contrast to Apex, Novel does not seek to hold schools accountable for implementation of its instructional design. Instead, Novel's hub monitors

student achievement and practice for the purpose of gathering feedback around network instructional resources. For example, hub leaders actively solicit teacher feedback about their practice during PD sessions, and use this feedback to inform hub decision-making around instructional resources. This approach reflects Novel's adaptive approach to instructional improvement where schools are left to make decisions about instruction appropriate for their classrooms free from direct monitoring and oversight by the hub.

Novel's design for managing for accountability has implications for the network's ability to track and support instruction. Although measures of student achievement are built into network curricular resources, Apex's adaptive approach to instruction encourages teachers to modify assessments to meet the needs of their students, and gives teachers discretion in using these assessments. Inconsistent and modified use of network assessments, and restricted access to standardized test results, limits the hub's ability to closely monitor practice. Moreover, the hub's limited presence in schools means the network must rely on teachers' self-reported data about their practice as a key mechanism for learning about practice. As a consequence, Novel does not have access to explicit and comprehensive data around implementation that would allow the network to closely track performance and practice. This minimizes its ability to provide more tailored supports to schools and classrooms.

The differing designs for accountability monitoring suggest the two networks conceptualize its work in different ways. Apex's focus on monitoring for accountability around the faithful implementation of its instructional design indicates the hub sees monitoring and oversight as a central component of hub responsibilities. This close monitoring functions to incentivize instructional guidance use by aligning performance measures to network curricular materials. It also helps the network to tailor its supports for individual teachers and schools. As

expressed by Novel hub leaders, managing for accountability is not viewed as a key domain of their work. Novel's hub sees itself as a network focused explicitly on supporting member schools, and not focused on holding schools accountable for performance. In the absence of strong indictors of student achievement and practice, however, the hub has a more limited ability to establish tailored supports based on school and classroom needs.

Managing for Continuous Improvement

Like managing for accountability, the networks show varying capacities for managing for continuous improvement. Apex shows evidence of a strong design for continuous improvement with established processes for data capture, meaning making, information sharing and embedding learning. This supports the network in continuously refining its instructional design in response to learning. Although Novel is organized to learn about certain aspects of its instructional design-- namely the quality of its instructional resources-- Novel shows evidence of a less developed design for continuous improvement.

Apex's design for continuous improvement uses robust structures and processes to support the ongoing refinement of the network's design for instruction and instructional improvement. Central to its design is a developed set of mechanisms organized to capture a range of data pertinent to its design for instruction. Mechanisms for data collection, such as measures of student achievement, observations of practice, teacher testers and network surveys, focus on capturing key data directly connected to the network's instructional design. This includes gathering data around student outcomes aligned to network instructional resources, measures of implementation data, and direct feedback on elements of the instructional design.

Apex utilizes this data by designing and using codified processes for sensemaking around captured data. Processes such as learning agendas, organizational planning processes, internal

work groups, and others support the network in learning from both base-level practices and more exploratory learning opportunities (Peurach, et al., 2016). For example, Apex's first-class planning process guides hub leaders through deep analysis of network performance to reflect upon established practices, and to identify opportunities for refinement. Learning agendas and interorganizational learning communities support the hub in exploring new, innovative practices that could help solve problems of practice.

The knowledge generated through codified processes is shared through developed channels for bilateral information sharing built into Apex's design. For example, principal cohorts and school PD and coaching establish two-way information channels. Through these channels, messages from the hub are relayed to the school, and messages about problems of practice from the schools get shared with the hub. These bilateral information channels, in concert with other sources of evidence, helps the hub to identify knowledge from the field that can be used to make improvements to the network's overall design.

Apex's learning is actualized as the network embeds developed knowledge through refinement of codified resources. This embedding occurs at both the hub and school level. At the hub level, Apex embeds this new knowledge through its explicit set of instructional guidance materials, such as network curricular resources, PD, and coaching structures. This knowledge spreads across the network through established channels of information sharing. At the school level, new knowledge is embedded through refinements to school-based coaching and PD. Apex's design shows evidence of designed processes to guide knowledge embedding. For example, Apex's first-class planning process supports hub leaders in establishing hub deliverables based upon data analysis to further refine its instructional design.

Novel shows evidence of a more developing, less robust design for continuous improvement. While Novel does capture a range of data about its design, the hub lacks established mechanisms to gather information around student achievement and program implementation. The hub relies on teacher self-reported data around implementation and data around client satisfaction with hub-developed curricular resources. This type of data lends itself to learning about its instructional resources, but does not support explicit learning about its instructional design more broadly. Novel recognizes the challenge the hub faces in capturing implementation of its design, particularly since they are not actively in schools. The hub is currently focused on establishing more authentic means of capturing implementation data.

Novel also exhibits fewer established processes for meaning making and information sharing around data captured. The main vehicle for meaning making and information sharing for Novel is through network PD sessions. Although PD sessions provide opportunities for bilateral information sharing between the hub and member schools, information sharing and meaning making in this context tends to focus on instructional resource use. There are few opportunities and established processes for the hub to make sense of knowledge captured regarding school level practice, and few mechanisms for embedding this knowledge back into its instructional design. The internal work groups show potential to support meaning making and knowledge embedding, but the new and underdeveloped status of these groups suggests this potential is not yet realized. With underdeveloped sources of data around its instructional design, learning about and from practice is not optimized. The network would appear to benefit from more systematic information coming up from schools, and established internal structures at the hub to capture and make use of this information.

Perhaps the most critical distinction between the network's designs for monitoring for continuous improvement lies in the network's ability to embed knowledge into its instructional design. Apex and Novel show varying capabilities and intentions for this work. Both networks actively embed learning into their instructional guidance materials as a means of encoding learning into the organizational memory. This step in the continuous improvement process is critical for networks to be able to iterate their instructional designs, and to actualize learning in ways that move the network as a whole forward.

However, Apex's hub shows evidence of greater attention to and capacity for embedding learning. Apex embeds learning through a) refining and codifying instructional guidance materials used across the network, b) refining school-based PD and coaching, and c) delivering additional resources identified as high-leverage for instructional improvement. Although Novel modifies its instructional guidance in response to network learning, its capacity for embedding learning into its broader instructional design is more limited. Instructional leadership support, for example, remains an area where Novel continues to struggle to embed learning into codified resources and processes for support.

It is unclear exactly what contributes to this distinction in the network's ability to embed knowledge. In part, this distinction speaks to the varying capacities of the hub for managing intellectual capital. Research conducted here suggests that the network's role in managing intellectual capital for the purpose of continuous improvement places substantial demands on the hub in terms of time, money, and expertise. However, this analysis goes beyond the scope of the work presented here. As scholars continue to explore managing continuous improvement, it is important to recognize that knowledge embedding is a weakly understood dimension of this work and is an area open for more empirical research.

Role of Network Dimensions

The networks' differing designs for managing performance can be seen as functions of the broader contextual factors and constraints under which these organizations operate. Similar to network designs for building educational infrastructure and designs for supporting the use of educational infrastructure in practice, network structure, governance, and purpose help to explain key differences in designs for managing performance within each network. Network composition does not seem to be a salient dimension helping to explain differences in network designs for managing performance.

Network Governance and Structure

As described in previous chapters, the networks studied here have fundamentally different systems of governance and structures. As a more centralized network with authority over member schools, Apex organizes its network to conduct close monitoring of instructional practice and outcomes. Apex uses this close monitoring to support network-wide learning and continuous improvement. As a more decentralized organization with limited authority over member schools, Novel's structure and governance arrangement creates challenges to managing performance, particularly in how the network monitors and learns about school-level implementation.

As a centralized network with a strong central hub, Apex is responsible for developing and implementing critical instructional operations including: instructional decision-making, instructional resource development, and instructional evaluations and monitoring. Apex uses its authority and capacity as a hub to establish and mandate a set of codified, base level practices across the network. The consistency in practice created as a result of these practices supports the network in closely monitoring practice. As such, Apex is able to both hold schools accountable

for faithful implementation of its instructional design, and to support Apex in gathering critical data necessary to learn about and refine its design.

As a more decentralized organization with limited authority over member schools, Novel's instructional design depends on an opt-in structure where teachers decide what network instructional supports they will access, and how to use those supports in practice. Novel sees this opt-in structure as essential for building buy-in among network members. However, this opt-in structure creates challenges for tracking implementation and student achievement. Inconsistent use of network assessments, restricted access to standardized test results, and absence of school-based observations limits how Novel learns about practice which is needed to continuously improve its instructional design. The network attempts to design around this challenge by actively soliciting self-reported information about implementation from teachers. Novel acknowledges, however, that there is a need to establish different and more robust mechanisms for learning about implementation of its instructional design.

Network Purpose

As a network that has engaged in the work of instruction and instructional improvement for nearly 20 years, Apex is no longer building a network design, but rather focusing on refining and replicating that design as it scales-up its network. Over time, the network has been able to curate a set of best practices, develop resources to support its use, and test its effectiveness in practice. This suggests the network is in a phase of refining (as opposed to developing) its design. Apex has constructed the infrastructure needed to be a learning organization over time, including mechanisms for capturing data, meaning making, information sharing, and embedding learning. As the network scaled-up, the competitive CMO market helped to motivate the network to continuously learn about and improve its instructional design. Apex's keen focus on

demonstrating results, and its long history of proven achievement, suggests that performance management is critical to replicating its design.

Novel appears to have a different purpose for its instructional design. As an external support provider operating in the non-profit sector, Novel depends more heavily on client satisfaction. This helps to explain why the network focuses on gathering information around teacher satisfaction with instructional materials and PD, and focuses less on closely monitoring practice and holding schools accountable. Moreover, Novel is still relatively new to the work of instructional improvement. It was not until the recent shift to becoming a NYCDOE contracted external support provider that Novel began designing for instructional improvement. The network is in a development phase of its design, and is still organizing internal processes for managing performance and continuously improving its instructional design.

Discussion

In this chapter, I have presented network designs for managing performance. This chapter finds that Apex and Novel have different intentions and capacities for managing accountability and continuous improvement. I also identified key points of comparison across network designs and described how critical organizational conditions, including governance, structure, and purpose, help to explain major distinctions in network designs for managing performance.

This analysis raises several points of consideration about network designs for managing performance. One consideration involves the relationship between managing for accountability and the networks' capacity for continuous improvement. As described in this chapter, Apex employs a range of mechanisms for managing accountability of its instructional design. These mechanisms include ongoing measures of student achievement and observations of practice for both teachers and leaders. In addition to using these mechanisms to hold schools accountable, the

mechanisms also function as critical sources of data for continuous improvement. Novel, on the other hand, does not see managing for accountability as a key facet of its work. Instead, the network focuses on gathering evidence around client satisfaction. This complicates Novel's ability to learn about and improve its instructional design as the network lacks established mechanisms for gathering evidence of practice. This suggests that for the two cases presented here, a network's ability to manage for accountability can either accelerate (as we see with Apex) or limit (as we see with Novel) its ability to continuously learn about and improve its instructional design.

Another important consideration involves the relationship between network type and hub beliefs about its role in managing performance. The networks studied here held different beliefs about the role of the hub in managing performance. Apex saw itself as both a manager for accountability and for continuous improvement. Novel saw itself, in part, as a manager of continuous improvement, but did see itself as a manager for accountability.

This difference in beliefs can be viewed, at least in part, as a function of network type. As a CMO, Apex depends upon demonstrated results of student achievement in order to remain competitive in its market. Apex has a strong incentive to hold schools in its network accountable for performance, and to continuously improve its design in the effort to demonstrate results. Novel, however, views itself as a service provider whose function is to support schools around instruction. Novel does not see itself as an overseer or manager of performance. Thus, Novel does not attend to performance management in the same ways as Apex. This suggests that understanding network types can help scholars to better understand why networks design for managing performance in the way that it does.

CHAPTER 7

Discussion

The preceding chapters of this dissertation explored and compared designs for instruction and instructional improvement in two NSI across three key domains of work: building educational infrastructure, supporting the use of educational infrastructure in practice, and managing performance. The broad purpose of this study was to identify how different networks design for and carry out the work of the aforementioned domains in pursuit of large-scale instructional improvement. Another purpose of this study was to explore how key network features, including governance, structure, composition, and purpose, create particular conditions under which these networks design, and the potential role of these dimensions in explaining network designs themselves.

The evidence and analysis presented above suggests that Apex and Novel have fundamental differences in their designs for instructional improvement, and that network dimensions can help to explain these differences. This comparative examination of Apex and Novel also suggests a collection of considerations that bear on the theory and practice of networks for improvement more generally. In particular, this study highlights a key theme of interdependence among key features of these networks, and underscores the complex nature of designing, managing, and studying networks of this sort.

I use this final chapter to share key lessons, and to identify theoretical and practical contributions of this study to the conversation around large-scale instructional improvement and network designs. I begin by providing a summary of the key findings. I then offer theoretical and practical contributions of this study. I conclude by setting directions for future research and presenting additional venues for inquiry.

Summary of Findings

Apex's and Novel's designs for instruction and instructional improvement represent different approaches to large-scale school improvement. The key point of differentiation lies in the relationship between (a) the specificity of the designs and (b) the overarching design principles of fidelity and adaptation organizing these approaches. The differences in designs can be explained, in part, by a set of network dimensions particular to Apex and Novel. I summarize below the key findings of this study, and present potential implications of the comparisons drawn.

Variation in Specificity

The networks' designs for instruction and instructional improvement vary in their level of specificity for practice. Apex has a highly-specified design that uses a set of explicit and actionable resources/practices to direct teaching and learning across the network. This includes an educational infrastructure comprised of: discipline-specific visions of instruction; formal resources for instruction, such as curricula, models of instruction, and assessments; and social resources for instruction to establish network-wide shared visions, norms, and understandings. Apex's design also includes detailed approaches for training and coaching network members to support the use of its highly-specified educational infrastructure in practice. This involves a set of established routines and resources organized explicitly around the network's educational

infrastructure. Apex's design also includes a robust set of indicators of practice that helps the network to monitor practice, learn from it, and refine its design in response.

Novel's design is comparatively less specified than that of Apex. While Novel's educational infrastructure establishes a vision for instruction, formal resources for instruction, and social resources for instruction, this infrastructure does not reflect an explicit and actionable set of resources. Rather, Novel's educational infrastructure establishes a set of broad guidance network members use in their own instructional design. The network supports the use of educational infrastructure in practice by establishing joint work opportunities to help teachers and leaders plan for the adaptive use of network resources. Novel has a comparatively thin set of indicators of practice that impacts the network's ability to monitor practice and to continuously improve its instructional design.

Design Principles

The networks' approaches to instruction and instructional improvement reflect different overarching principles for design: Apex uses a fidelity-based design principle and Novel uses an adaptation-based design principle. Apex's highly-specified set of resources/practices and ongoing monitoring of practice seeks to promote faithful implementation of the network's design. The intended product of this design is a version of instruction that is defined by the network and implemented by network members. By contrast, Novel's less specified set of resources/practices seeks to guide (but not direct) practice. The network aims to provide support to network members in developing adaptive, classroom-level practices. The intended product of this design is a version of instruction that is informed by the network's vision of instruction, but developed by teachers to meet the needs of their classroom.

Network Dimensions

Apex and Novel are different types of networks, varied in network structure, governance, composition, and purpose. These differences in network dimensions help to explain major distinctions in network designs. Apex is a centralized network with authority over instructional decision-making. The network serves a relatively homogenous composition of schools that share similar school and student demographics. As an expanding network, Apex is focused on producing high-quality results, and replicating those results as the network scales-up its instructional design to new schools. As such, Apex's strong central hub establishes a highly-specified set of instructional resources/practices that member schools use explicitly in their practice. This highly-specified and fidelity-based design helps the network to address common challenges seen across the network, and also aids in replicating its design in new contexts.

In contrast, Novel is a decentralized network, with authority over instructional decision-making residing with member schools. The network serves a more heterogeneous population of schools that vary across a range of dimensions, including location, size, socioeconomic status, and achievement. As a network that is newer to the work of instruction and instructional improvement, Novel is still developing a program of support and is not focused on replicating its model in new contexts. As such, Novel's decentralized hub establishes a set of instructional resources/practices member schools can use when designing its own instruction. This more adaptive approach to instruction and instructional improvement helps the network to support schools in addressing challenges particular to individual schools.

The findings presented here highlight potential implications for understanding NSI designs for instruction and instructional improvement. First, these findings suggest that understanding network designs require fundamental understandings of network type. This is

important as a network's particular dimensions creates a set of complex conditions under which these networks design. Second, these findings suggest that designs for instruction and instructional improvement likely reflect certain core, overarching principles of design. Understanding a network's overarching design principle can help to explain a range of things, including how and why a network designs in the ways that it does. I discuss these topics further throughout this chapter.

The findings presented here are consistent with some of the broader research on NSI (Cohen et al., 2014; Datnow et al., 2005; Glennan et al., 2004; Peurach et al., 2016; Stringfield et al., 1996; Wohlstetter et al., 2015). In particular, this study underscores that NSI designs vary in their level of specificity, and in the overarching principles for design organize their work. This is consistent with research on CSRs and other reform networks that identify a range of unique and diverse designs for instructional improvement in networks of this sort (Cohen et al., 2014; Datnow et al., 2005; Stringfield et al., 1996; Wohlstetter et al., 2015). This suggests that NSI approach the work of instructional improvement differently, and that scholars can use levels of specificity and design principles as a means to characterize, sort, and compare these designs.

This study also accentuates the complex and interdependent nature of leading and managing NSI that is reflected in existing research in this area. The networks studied here ran up against a set of challenges as the networks attempted to coordinate across their educational infrastructure, implementation supports, and systems for monitoring performance to better support instructional improvement. This reflects prior research on NSI that highlights the interdependency in designing, implementing, and improving network designs (Cohen et al., 2014; Peurach et al., 2016), and the complex nature of designing and sustaining these networks (Glennan et al., 2004).

Existing research also suggests that addressing these challenges involves NSI continuously improving and reiterating their designs as they navigate the challenges (Cohen et al., 2014; Glennan et al., 2004; Peurach, 2011; Peurach et al., 2016). The findings from this study further emphasize the need for evolving and iterative network designs. The networks studied here refined their designs both in response to learning in practice, and in response to critical challenges networks faced as they sought to improve their designs over time.

This study extends research on NSI by identifying and applying a set of dimensions connecting network structure with functions to help understand why networks design in the ways that they do. Findings from this study suggest that network structure, governance, composition, and purpose function as analytic constructs that can help scholars and others to better understand and explain network designs. Using network dimensions helps to push research in this area forward by establishing a set of analytic constructs to support analysis of network designs for instructional improvement. This represents a new frontier for research in this area. I explore this new agenda in more detail in the following section.

Theoretical Contributions

With growing interest in NSI as a potential solution for large-scale instructional improvement, scholars are beginning to carve out a research agenda. This agenda focuses on understanding network designs and their use in practice, and on how networks function more broadly. Contemporary research on NSI uses mostly single case studies to explore the specific designs, implementation, and outcomes of networks engaged in this work. A smaller subset of the literature takes a comparative perspective on network improvement strategies in the effort to understand different types of models for supporting reform efforts. Despite this existing research, the scholarly community has yet to establish systematic theoretical approaches to understanding

network instructional improvement. Although scholars have taken steps in this direction by identifying analytic categories to support network analysis (e.g. de Lima, 2010; Peurach et al., 2016; Peurach et al., in press; Russell et al., 2015; Wohlstetter & Lyle, 2019), the field continues to wrestle with how to wade into networks of this sort, both analytically and empirically, to develop more robust and systematic understandings of NSI.

This dissertation took a step forward by developing an analytic framework driven by the literature on NSI to better understand network designs for instructional improvement. It empirically tested this framework using the two cases studied here. In particular, this study explored what scholars identify as three core domains of building instructionally-focused education systems, and tested a set of network dimensions as potential explanatory factors for NSI designs.

Empirical evidence from this study finds the three domains of work—building educational infrastructure, supporting educational infrastructure use in practice, and managing performance—hold up empirically as core elements of NSI activity, and serve as a generative frame for studying network designs for instructional improvement. This study also finds that key network dimensions, including network structure, governance, composition, and purpose, help to explain why networks design for instruction and instructional improvement in the ways that it does.

Evidence from this study also finds a key theme of interdependence that runs through these accounts. While the framework used here presents the core domains and network dimensions as analytically distinct features, findings from this study indicate these features are confounded in practice. This underscores a more robust conceptualization of the core domains and network dimensions; a conceptualization in which these features do not function in isolation,

but rather are inherently connected, reciprocal, and needing to be coordinated. This refined conceptualization highlights the intricate nature of NSI, and suggests that the work of designing, managing, and studying networks of this sort is inherently complex. This points to a next frontier for research on NSI that focuses on how individuals lead and manage these networks amid the endemic complexity and interdependence in this work.

In the following sections, I present the major themes and theoretical contributions emerging from this work, and reflect on the usefulness and accuracy of the preliminary analytic framework presented here in light of study findings. I also draw out the key theme of interdependence and complexity that runs through this analysis.

Core Domains of Instructionally-Focused Education Systems

One purpose of this study was to apply three of the five core domains of building instructionally-focused education systems--building educational infrastructure, supporting the use of educational infrastructure in practice, and managing performance-- as analytic constructs for understanding the work of NSI. Findings from this study show these domains to reflect core aspects of work in which the networks studied here engage. However, the extent to which and the ways in which the networks designed for and carried out these domains of work varied. Apex built a highly-specified educational infrastructure and supported its use through a set of detailed routines and resources for implementation and performance management. Novel established a comparatively less specified educational infrastructure and set of implementation supports, and did not view performance management as central to its work as an NSI.

Despite critical differences in how Apex and Novel engaged in these domains, the findings presented here suggest the identified core domains of activity serve as a generative lens for studying the work of NSI. In empirically testing these domains in the two NSI studied here,

building educational infrastructure, supporting educational infrastructure use in practice, and managing performance, emerged as critical and authentic categories that can help scholars to analyze this complex work.

Analytically Distinct Domains of Work

In both cases, analyzing these domains served to isolate and dig deep into critical aspects of NSI activity, allowing for a more nuanced understanding of each design. Analyzing these domains also helped to compare designs across networks in more systematic ways. For instance, PD emerged as a function of network designs that could be analyzed as a component of each of the three domains. PD was part of the network's educational infrastructure as a key feature for building social norms and understandings in the network. When enacted PD was also key to supporting design use in practice. It also provided a context for collecting evidence of practice for the purposes of managing performance. Analyzing PD in the context of these three core domains, for example, served to highlight its nuanced role in each network, helping to build more substantive understandings of network designs more broadly and allowing for more precise comparisons across networks.

While parsing out the practical work of the networks into these core domains provides a useful frame for understanding and comparing network designs, critical differences in how networks carried out these core domains brings about a growing set of empirical and practical questions that scholars and others might consider when analyzing these networks. For instance, one might consider whether or not the networks themselves identify the core domains as key aspects of their work. Apex, for example, saw the three domains as central to its role as a hub, as evidenced by the network's explicit designs in each domain. Novel, on the other hand, viewed itself primarily as a service provider concerned with meeting the needs of network members, but

not as direct managers of performance. Performance management was the role of local superintendents who have direct oversight over Novel schools. As a result, Novel exhibited less developed designs for monitoring performance and, as a consequence, continuous learning and improvement. Understanding what NSI see as key functions of its own work can help to illuminate potential explanations and rationales for why networks design in the ways that they do, and help scholars to better understand broader network goals and intentions.

Overlapping and Interdependence in Practice

Another question to consider involves the relationships that exist among the core domains. By that I mean how do designs for educational infrastructure, support for infrastructure use, and performance management interact to support the larger organizational goals for instructional improvement? This moves beyond understanding the core domains as analytically distinct features of work, and treats these domains as inherently connected, reciprocal, and coordinated.

For instance, this study found that both networks' educational infrastructure, particularly its formal resource for instruction, shaped how Apex and Novel supported network members and how the networks managed performance. For Apex, PD and coaching sessions focused directly on providing opportunities for teachers and leaders to practice enactment of these resources. Built-in features of the network's curriculum, such as network-wide interim assessments, served as key sources of data the hub used to manage performance. For Novel, hub-developed educational infrastructure, such as scopes and sequences, served as mechanisms to organize network PD and supported collaboration among network members around content-specific practice. However, inconsistent use of network-wide assessments limited Novel's ability to manage performance in its network.

This phenomenon speaks to the interdependence of these core domains of work. Practically, this evidence suggests that the work of leading instructionally-focused education systems is quite complex. It involves not only designing and managing in the three core domains, but also involves actively coordinating across them. Managing in this way would have network leaders keenly aware of how these domains interact, and able to make key design decisions in light of this. Analytically, this evidence suggests that understanding the work of instructionally-focused education systems is, in itself, complex. Understanding this work would have scholars capturing how network leaders coordinate across these domains, and building conceptual understandings of this coordination.

Implications for Future Analysis

The analytic frame for the core domains of building instructionally-focused education systems presented by Peurach et al.'s (in press) serves as a useful starter to guide more systematic empirical and analytic work in this area. However, analysis from this study suggests that several things are needed to push inquiry in this area forward. One, we need to sharpen our conceptualizations of these different domains of work. For practical purposes, this study explored just three of the five domains of work identified as central to building instructionally-focused education systems. While these domains held up as analytically salient features of NSI activity, we should give attention to the remaining two domains-- managing environmental relationships and distributing instructional leadership-- to fully test these features as core domains of activity. We might also build more nuanced understandings of what the work in these domains entail, and refine our conceptual understandings to reflect those features most central to this work.

Two, we need to systematically identify key points for interdependence (as I have begun to do here). This would require looking across domains to understand how work is coordinated (or not) in these systems. It would also in identifying the implications of this coordination (or lack thereof) on instructional improvement.

Third, and perhaps most critically, we need to explore more deeply the work of those leading and managing these networks. As described in this section, networks of this sort are inherently complex and interdependent. This suggests that leading and managing these networks is, too, complex and interdependent. A next frontier for understanding NSI would include rich analysis of those leading these networks. This would include empirically examining ways in which interdependencies manifest in leaders' practices (e.g. as dilemmas, challenges, puzzles) and probing for patterns of these dilemmas among leaders. It would also include exploring the types of knowledge, skills, and disposition leaders draw on as they manage networks focused on instructional improvement.

I lay out some empirical and practical considerations above that emerge from using the core domains of building instructionally-focused education systems as a lens for analyzing and understanding NSI. However, these reflect but a small sample of potential questions/agendas that might emerge from applying this analytic frame. Should scholars continue to use these domains to guide future research, and I suggest that they do, I anticipate that more (and more substantive) questions will surface to help develop nuanced understandings of the domains themselves.

Network Dimensions as Potential Explanatory Factors

In addition to applying the three core domains of building instructionally-focused education systems, this study also explores a set of network dimensions as potential explanatory factors for understanding network designs for instructional improvement. These include network

structure, governance, composition, and purpose. Findings from this study indicate these dimensions, in part, help to explain Apex's and Novel's design for educational infrastructure, support for educational infrastructure use in practice, and performance management. It also shows that these dimensions reflect appropriate and generative constructs that scholars should consider when analyzing networks of this sort.

Similar to the theme described above, evidence from this study indicates this set of dimensions may be analytically distinct, but are confounded in practice. As a result, there are limits to the conclusions scholars can draw from examining any one dimension. Rather, scholars should use these dimensions (and more) as a body of potential explanatory factors that, as a collection, can help to understand network designs.

In this section, I provide a brief summary of key learnings for each of the network dimensions studied here. I also identify a set of further analytic questions and thoughts scholars might consider when applying these dimensions in future research.

Structure

In exploring structure as a key dimension for understanding network designs, the role of network centralization emerged as a recurring theme shaping how networks design for and carry out their work. Centralization, as it is used here, refers to the extent to which relations and communication patterns within it center around one or only a few prominent actors of subgroups (de Lima, 2010). Findings from this study indicate that the level of centralization in Apex (a centralized network) and Novel (a more decentralized network) helps to explain how work was coordinated across the core domains of work.

For instance, in Apex the hub took up the work of coordination by managing most aspects of design and support work -- developing educational infrastructure used across the

network, establishing a system of implementations supports around using that infrastructure in practice, and monitoring performance. As a result, schools (and teachers) were not responsible for coordinating these various components, but were instead focused on implementing the design Novel, a more decentralized network, did less to coordinate across these domains of practice. Although the network did coordinate elements of educational infrastructure and supports for implementation (namely curriculum and PD), the hub did not coordinate these efforts with performance management, nor did they coordinate these efforts with particular school-based agendas or initiatives. As a result, coordination across these domains fell more squarely on member schools. From one perspective, this could be viewed as putting a great deal of responsibility and onus for coordination on individual schools and teachers.[28]

The level of centralization observed in these networks also appeared to influence how Apex and Novel were able to continuously learn about and improve their instructional design. As a centralized network with tighter control over instructional design, Apex's hub had greater capacity to surface critical knowledge from schools and classrooms around practice and student achievement. The hub did this through a collection of data sources, including network-wide assessments, observations, and more. Centralized responsibility over instructional design allowed Apex to build this critical learning back into the design itself by modifying its centrally-designed supports. In doing so, the hub more systematically spread that learning across the network.

Novel, on the other hand, is responsible for portions of instructional design, namely developing aspects of educational infrastructure, such as scopes and sequences and curricular resources, but leaves much of the instructional design work to schools and teachers. As a result

[28] Others might argue that this decentralized structure focused less on coordination across the domains of practice helped schools to retain a higher level of autonomy and agency in making instructional decisions appropriate for their schools and classrooms. Further data collection from the school and teacher level is needed to make a more definitive claim regarding the impact of decentralization.

of this more decentralized approach to instructional design, the network hub was not able to surface knowledge around local practice and student achievement in the same ways as was observed in Apex. This limited Novel's ability to generate critical knowledge around its instructional design and embed that learning into the network design in ways that spread across the network as a whole.

While centralization emerged as a recurring theme in analysis of structure as a key network dimension, there are other themes that might emerge as critical to understanding the role of structure in network designs for instructional improvement. For instance, density is identified in the literature as important to network structure, but was not explicitly addressed in the analysis here. As described in the literature, density can be an indicator of a network's ability to distribute information, trust, and influence among network partners (Huang & Provan, 2007; Yamaguchi, 1994), and engage members in collaborative work (Goldsmith & Eggers, 2004). Through preliminary analysis, Apex appears to be a denser network given the frequency of connections (through PD, coaching, and other opportunities) between network members and the hub. Novel appears to be less dense given more infrequent opportunities for connection. These differences may tell us something about the networks' ability to distribute information, establish trust, and build influence in the networks. However, density was weakly developed as an analytic concept in this study and, although I see great potential for this concept as an analytic tool, no conclusions can be made here. I suggest future research take up this concept with more rigor as I see it as having analytic power.

Governance

As described by scholars, network governance is concerned with power structures and decision-making authority within the network and its implications on network operations (de

Lima, 2010; Russell et al., 2015; Wohlstetter & Lyle, 2019). Evidence from this study indicates that, in part, network governance helps to explain Apex's fidelity-based approach and Novel's adaptive approach to instructional improvement. Apex's strong governance and authority over member schools is more amenable to a fidelity-based approach to instructional improvement given its ability to monitor instruction and to make instructional decisions. Apex's explicit relationship with member schools, as established in its network charter, gives the hub and member schools clearly identified roles and responsibilities; the hub responsible for instructional design and schools responsible for implementation of that design. As such, Apex's strong, centralized hub with instructional decision-making authority establishes a highly-specified design for instruction, and enforces its use through ongoing monitoring of performance.

Novel's limited governance and authority over member schools is more amenable to an adaptive approach to instructional improvement. With more limited authority, Novel relies upon an opt-in approach to its instructional design. It incentivizes opting-in by offering what the hub sees as high-quality resources and supporting teachers in using these resources in ways that meet the needs of their classrooms and students. As such, teachers retain authority over instructional decision-making in the network. As described by hub leaders, the opt-in structure is important to building what the network sees as a coalition of willing participants and helps the network to draw in practitioners interested in using network-developed resources.

However, this opt-in structure also means that only a segment of network members participates in its instructional design. Moreover, with limited authority over schools the network is not able to manage or organize school-based supports, such as site-based PD and coaching. These remain under the purview of school leadership who make determinations about how best to support their teachers.

This study conceptualized governance mainly as a function of who retains authority over instructional decision-making and oversight in the network, however, there are other ways in which scholars might think about and analyze governance when studying NSI. More nuanced views of governance might look more closely at authority and power structures throughout the network as a whole, such as decision-making authority within schools or within departments and among personnel at the hub level. One might also look more closely at different aspects of governance, such as budget, personnel decisions, and others, to understand how those aspects shape network designs for instructional improvement. Finally, the field would benefit from analyzing governance from the teacher perspective to understand how teachers view their authority and the authority of others in the network, and what this means for their work.

Composition

As described in the literature, network composition refers to the collection of actors within a network and the specific resources they bring to their work (Russell et al., 2015). This includes the composite of individual actors or collective actors within the network, for example individuals, schools, or organizations embedded within the network (de Lima, 2010). It also includes the particular skill, knowledge, and expertise members bring to the network. This study took a particular angle to analyzing composition within these networks, concerned mostly with the general composition of schools within the network.

In the case of Apex, the network was comprised of a relatively homogenous population of schools. As a CMO, Apex establishes and manages each school in its network and, as a result, all schools in the network operate under common missions, initiatives, and mandates coming from the hub. Member schools also tend to serve communities with similar demographics. Given

the level of homogeneity of schools in their network Apex was able to identify and address common challenges by building network-wide supports for schools.

Novel, on the other hand, served a more diverse composition of schools. As described by hub leaders, differing mandates, initiatives, and school populations created a range of different needs for schools in its network and, at times, hub-developed supports were in conflict with these differing needs. As a result, building network-wide supports that could meet the individual needs of member schools proved more challenging for Novel.

As scholars continue to analyze composition as a key dimension of network-based design, it will be important to pursue different aspects of composition in future studies. In particular, scholars might focus on the composition of the network more broadly to include the composition of the hub itself, including the positions, background, responsibilities, beliefs, etc. of hub members. Scholars might also conduct deep analysis of the particular skill, knowledge, and expertise of those comprising both the hub and member schools to gain better understandings of and to build rationales for network designs. Finally, scholars should consider the range of external players, such as other governmental and nongovernmental organizations, partners, strategic alliances, and others, that work with the network, either directly or indirectly, as those external players bring with them a collection of resources, skills, and challenges that likely influence how NSI carry out their work.

Purpose

As described in the literature, network purpose refers to the substance or mission driving the work of the network. Network purpose may vary in scope, ranging from a broad focus on increasing educational opportunities for all students to a narrower focus on improving literacy instruction (Wohlstetter & Lyle, 2019). It is often informed by the reasons and motivations

behind the creation of the network, and the core mission and beliefs of the network. This study finds a slightly different interpretation of network purpose to be important to understanding NSI and its designs for instructional improvement. Evidence from this study indicates that in addition to organizational mission and core beliefs, where the network is in its development, and its organizational history, can help to explain network designs for instructional improvement.

As a developed network that has engaged in the work of instruction and instructional improvement for nearly 20 years, Apex is no longer building a network design, but rather focusing on refining and replicating that design as it scales-up its network. Over time, the network has been able to curate a set of best practices, develop resources to support its use, and test its effectiveness in practice. As a result, the network offers a robust, vetted program of instruction that, when replicated with fidelity, supports the network in scaling up.

Novel is comparatively newer to the work of instruction and instructional reform and is not focused on replicating a model. Rather, Novel is focused on building a program to support a diverse set of schools. Novel has shifted its organizational focus over time in ways that Apex has not. First established as an intermediary for philanthropic money, Novel originally focused on building new, small schools across NYC. Since then the network transitioned to working with a subset of district schools around instruction and instructional improvement. Given this shift in focus, Novel is still establishing core portions of its instructional design, and can be considered in a more developmental phase compared to Apex.

Although this study finds level of development and organizational history to be important components of network purpose, scholars should also focus explicitly on identifying and understanding the genesis of network (de Lima, 2010; Wohlstetter & Lyle, 2019) and original and evolving missions of the network to better understand network designs. Scholars might also

focus on the scope of network focus for instructional improvement, such as whether the network offers whole-school designs or more targeted programs of support. Attending to these additional foci would add additional nuance to conversations around network purpose and its impact on designs for instructional improvement.

Applying and Building a Collection of Dimensions

Applying network dimensions. The key dimensions of networks applied here—network structure, governance, composition, and purpose— are important to consider in our analysis of NSI as these dimensions set the conditions under which the networks design. Although presented as analytically distinct dimensions of networks, evidence indicates this set of dimensions are confounded in practice, and disentangling these dimensions as potential explanatory factors can be analytically troublesome. As a result, there are limits to the conclusions scholars can draw from examining any one dimension. I argue here that scholars should use these dimensions as a collection of potential explanatory factors that, together, can help to understand network designs.

To illustrate this issue, I draw on Apex's design that focuses on a highly-specified and fidelity-based approach to instructional improvement. As described above, Apex's structure and governance helps to explain, in part, the network's design for instructional improvement. As a centralized network with autonomy over instructional design, Apex's strong central hub establishes a set of highly-specified resources/practices to direct teaching and learning across the network. The hub uses its authority to mandate design use at the school-level, and to monitor implementation of this design.

Yet Apex's structure and governance only helps to explain the network's design in part. Apex's highly-specified and fidelity-based design also supports the network in replicating its model in new contexts as the network scales up—a core purpose of the network. Its design helps

new schools to get up and running by providing a highly-specified educational infrastructure and set of supports that can be replicated at new sites. This design also helps the hub in managing and supporting a wide network of schools that spans across five geographic regions. Despite geographic distance between member schools, the highly-specified design creates a level of consistency in instruction across the network that allows the hub to streamline instructional supports.

The network's structure, governance, composition, and purpose each help to explain, in part, Apex's design for instructional improvement. Yet, disentangling these dimensions as potential explanatory factors to determine how or to what extent dimensions shaped the network's instructional design is both analytically difficult and, quite frankly, futile. Analyzing any one dimension would provide only a glimpse into the story of why networks design in the ways that they do, but in looking across these dimensions as a collection of potential explanatory factors one can begin to develop a more holistic understanding of what contributes to network designs for instructional improvement.

Building a collection of dimensions. In addition to arguing here that scholars apply key network dimensions as a collection to help explain network designs, I also argue that there are other useful and appropriate network dimensions to be identified and considered as part of this collection. Although I focused here on the role of network structure, governance, composition, and purpose as key dimensions, anecdotal evidence from this study points to other dimensions that might be important for analysis. For instance, the literature identifies network performance (Russell et al., 2015) and effectiveness (de Lima, 2010) as key dimensions for network analysis, but were not dimensions studied here. Evidence from Apex suggests that network and school-level performance is critical to how they design given their deep attention to performance

outcomes as key measures of their instructional design. Moreover, as a CMO their legitimacy as a network depends upon the network's ability to achieve demonstrated results, suggesting network performance is critical to its design for instructional improvement.

Another element identified in the literature as a key network dimension but not applied here is independence. This refers to the network and its relationship with schools or school districts, which can be independent of, yet attached to traditional schools or school districts (Wohlstetter & Lyle, 2019). This concept would be particularly important for understanding Novel's design as the network is inextricably linked to other NYCDOE structures, like local superintendent offices, borough field support centers, and the NYCDOE itself. Anecdotal evidence from this study finds that these entities place particular demands and constraints on Novel that informs its design for instructional improvement. For example, in some cases local superintendent offices asked Novel to establish particular supports for individual schools that were struggling. This included supports such as working directly with school leadership and developing leadership tools to support school-wide improvement. Although this concept was discussed to a certain extent in my analysis of Novel's system of governance, further attention to the particular relationships that exist between Novel and other NYCDOE structures could add further nuance to understanding why the network designs in the way that they do.

Another potential dimension to consider is the network positioning in the broader environmental landscape. This would include analysis of where the network sits in relation to local, state, and federal policy, and how susceptible the network is to changes in these environments. It would also include analysis of the role of the network in influencing particular policy changes within these environments.

Anecdotal evidence from Apex and Novel indicate this as an important dimension. In this study, Apex's position as a CMO kept the network buffered from local NYCDOE's changing internal structures, whereas Novel was particularly vulnerable to these changes. The shifting NYCDOE structure caused Novel to make changes in the type of supports it provided to schools, as well as to broader organizational operations such as personnel and management in the network. Apex, on the other hand, remained more focused on its established structure and mission as they were removed from shifting local politics.

I encourage scholars to continue to press on these additional network dimensions to determine if they have any explanatory potential. I also encourage scholars to consider other potential dimensions to take to this work as it could bring further analytic insight into how these networks operate.

Practical Contributions

In addition to the theoretical contributions discussed above, this study presents a set of practical contributions for those working in NSI, and for those engaged in school improvement efforts more broadly. Despite critical differences in network designs for instructional improvement and in the network dimensions, Apex and Novel experienced similar phenomenon when enacting its design. These phenomena highlight the complex nature of designing, leading, and managing in these networks. In this section, I present three key phenomena experienced in both networks in the attempt to begin etching out practical understandings from which practitioners and others might take valuable lessons.

Establishing and Managing Fundamental Conditions

As discussed in the previous section, the network dimensions explored here-- network governance, structure, composition, and purpose-- create a set of conditions under which NSI

design. While network dimensions set the conditions under which NSI operate, it is important for practitioners, particularly those leading and managing these networks, to see these factors not as inherent constraints that determine what their designs can look like, but as critical elements around which they can and should design. In doing so, network leaders can begin to manage some of the complexity in their work by designing solutions to critical and complex challenges facing the network.

In this section, I elaborate on how the network leaders addressed some of the complexity in their work by managing network dimensions in thoughtful and generative ways. I argue that network leaders would be well served to develop keen understanding of the particular conditions inherent to the NSI in order to address critical challenges through network design. To elaborate on the claim raised above, I draw on several examples from the two networks studied here.

As identified by network leaders, Novel faced a critical challenge in streamlining its instructional supports for teachers. Until recently, Novel supported individual teachers in developing their own unit and lesson plans. For a variety of reasons, this approach became unsustainable and the hub adapted its design to establishing a set of instructional resources and providing PD to teachers around those resources.

Yet given Novel's position as an external support organization, the network had no formal authority over instructional decision-making in its network. Novel could not mandate teachers use these resources, nor mandate participation in its PD. Instead, the hub needed to incentivize network members to take up these resources and supports voluntarily. The network designed for an opt-in approach where teachers received PD around what the network viewed as high-quality instructional resources in exchange for their commitment to a set of base-level practices (using the network's scope and sequence and set of instructional routines).

Through this design, Novel was able to both enlist a critical mass of teachers in the network's PD, and also establish a set of base-level practices that enabled teachers to work collaboratively around instructional design. In doing so, the network streamlined its supports, allowing Novel to support a wider-range of teachers across the network.

Novel's new design for instructional improvement exemplifies the network's ability to manage fundamental network conditions to address complex challenges facing the network. In recognizing the unsustainability of its former design, the hub established a new design that recast how it supports teachers around instruction. The hub was able to circumvent its limited authority around instructional decision-making by establishing a set of instructional resources and support, and incentivizing teachers to voluntarily opt-in to its use. In doing so, Novel was able to navigate the inherent conditions under which the network was designing and develop a solution to a complex challenge it faced.

Another challenge Novel continues to face is how to address the diverse composition of schools with which Novel works. Within Novel's heterogeneous population of schools in its network, there are a range of differing mandates, initiatives, and goals in each school that, as described by network leaders, can undermine implementation of the network's design. For instance, network leaders explain that some school initiatives stand in contrast to practices and philosophies embedded within the network's curricular resources, which causes teachers to make difficult decisions about which message to follow in their instruction.

Novel's solution to this challenge was to build supports for school leaders to develop understandings around the network's curriculum, and to help bridge leadership thinking around how these curricular resources fit with school-based goals and initiatives. Through this support, Novel aimed to address complex implementation challenges caused by working with a diverse,

heterogenous population of schools with varying sets of messages and goals around instructional improvement.

Novel had limited success with this effort, however. The hub found that many instructional leaders worked across multiple content areas, and that developing substantive understandings around the goals, intentions, and practices embedded within each of the curriculums was difficult. The hub still identifies this as a key challenge in its work, and an area in which it is actively seeking to design a solution. The hub's push to develop leadership-specific supports to address implementation reflects Novel's attempt to design ways to mediate the challenges resulting as a product of the inherent features of the network's composition. Yet, the hurdles it faces in doing so serves to highlight the complex nature of supporting schools with a vast set of individual needs.

Apex also shows evidence of managing network conditions, namely its highly centralized structure, to address complex challenges. As described by scholars, centralized structures often create "one size fits all" solutions that fail to make distinctions among different kinds of school and classroom contexts (Lieberman, 2000). Apex's centralized structure suggests it might be vulnerable to these challenges. However, evidence from this study finds that Apex has actively designed ways to be acutely aware of teacher and school needs, and to be responsive to those needs. This is evidenced through Apex's explicit designs for learning about practice, and its designs for embedding that learning back into its instructional design. In doing so, Apex has been able design around some of the inherent challenges of highly centralized networks—that is understanding school needs and responding to them.

I argue that there are two underlying lessons practitioners and others might take from this analysis. First, network leaders stand to benefit from establishing keen understandings of the

conditions inherent to the configuration of their network—that is, what is the structure, governance, composition, purpose, and other pertinent features of your network, and how do these features shape network designs for instructional improvement? Understanding these key dimensions can help network leaders recognize the conditions under which they are designing. Second, network leaders need not view these dimensions as inherent constraints that determine what their designs can look like. Rather, I argue that network leaders view these dimensions as critical elements around which they can and should design. In taking up this lesson, it shifts the perspective from what is not possible, to what is possible given a strategic design.

Fidelity to Enable Adaptation

A second phenomenon observed in this study involves the role of fidelity-based components of network designs as mechanisms to support and enable adaptive use. Throughout this study, I presented fidelity-based and adaptive approaches as a key distinction in network designs—Apex's design as a fidelity-based approach and Novel a more adaptive approach. Presenting these designs in this way frames fidelity and adaptation, in some ways, as conceptually antithetical. Yet in practice, these design principles proved to be interdependent. In this section, I move beyond addressing fidelity-based and adaptive approaches as distinct design principles, and focus on the interdependence of these approaches in practice.

As described throughout this study, Apex relies on a fidelity-based approach to instructional improvement. Apex's highly-specified design establishes a set of explicit and actionable resources/practices to direct teaching and learning across the network. While I characterize Apex's design as using a fidelity-based approach, findings from this study show the network's fidelity-based elements of this design actually supports a level of adaptation critical to Apex's design.

In particular, Apex's focus on faithful implementation of the network's design helps hub-level and school-level leaders to adapt supports to meet the individual needs of the local context. The network's highly-specified educational infrastructure, including curricular resources and assessments, provides the hub and school leaders with frequent information regarding student achievement, and helps leaders to identity the particular needs of the local schools. Through established routines for school-based support, such as structures for PD and coaching, Apex's design provides frequent, built-in opportunities for hub and school leaders to address these needs. This includes adapting coaching and PD to focus on building particular skills germane to individual school and teacher needs. The same is also true for regional superintendents working with school leaders. Frequent data on school-level performance allows regional superintendents to tailor their coaching and PD supports for school leaders around the particular needs of that school and the teachers within it.

I observed a similar phenomenon for Novel. While characterized as having a more adaptive approach to instructional improvement, the network depends on elements of fidelity to facilitate adaptation. Under Novel's approach, the hub establishes joint work opportunities for teachers to work collaboratively to design instruction that meets the needs of their classrooms. Yet without certain fidelity-based elements of Novel's design, the network would be unable to actualize this adaptive approach. In particular, the hub establishes a set of base-level practices (use of common scopes and sequences and instructional resources) as a condition of PD. These base-level practices allow teachers to work collaboratively by encouraging them to teach roughly the same things, at roughly the same time, using roughly the same resources. In doing so, these base-level practices created the substance and fodder around which network members could collaborate to develop adaptive classroom practice.

Evidence of this phenomenon in these networks is consistent with existing research on large-scale school reform and in organizational management that identifies formalized, codified knowledge as central to building organization-wide capacity for improvement (Adler & Borys, 1996; Peurach, et al., 2016; Winter & Szulanski, 2001, 2002). As suggested in this literature, and as conceptualized in this study, one should move beyond viewing fidelity-based approaches as "coercive mechanisms for exercising tight control over outlets" toward a conception of these as "an enabling resource" capable of moving network members beyond their immediate capabilities (Peurach et al., 2016).

I do not argue here that a tight, fidelity-based approach is a more beneficial or necessarily preferable approach to instructional improvement. Rather, I argue that understanding the ways in which fidelity-based and adaptive components of a network's design are interdependent is important to building our practical understanding of NSI designs. I encourage practitioners to think about ways in which their own network designs may benefit from fidelity-based components to support the more adaptive features of their design.

Minding Increasing Design Complexity

A final implication from this study for practitioners and others is to be mindful of the effects of increasing design complexity. Despite key differences in the networks' designs for instructional improvement, both networks experienced similar challenges as its design increased in complexity over time. As network designs for instructional improvement became more elaborate and complex, it placed new challenges across the network, but, in particular, for school instructional leaders. In both cases, new, elaborated designs served to recast the knowledge and skills needed for school instructional leaders to do their work, and challenged the networks to

support instructional leaders in developing knowledge and skills. In this section, I describe the leadership challenge emerging from each network's increasingly complex instructional design.

In the case of Apex, newly elaborated instructional materials, including the development of daily lesson resources and aligned protocols for school-based coaching and PD, increased the level of specificity of content and pedagogical approaches around which instructional leaders needed knowledge and expertise. Apex's newly-developed and highly-specified instructional resources required leaders themselves to be experts on the content and technical substance of resources to effectively support its use in practice. This posed particular challenges for leaders coaching across multiple content areas, or in areas in which they had limited expertise. It positioned leaders not just as instructional leaders, but as experts needing deep knowledge of both the content and the instructional resources. This challenge seemed to be exacerbated by Apex's intense design for school-based PD and coaching that demanded ongoing and frequent teacher-level support around instructional resource use.

Novel experienced a similar challenge. When Novel moved away from supporting individual teachers around unit and lesson planning to establishing instructional resources and aligned PD, it created a unique set of challenges for the network. If school instructional leaders were to support their teachers in using Novel's curriculum, it would require the leaders to have a deep understanding of both the goals and strategies driving the curriculum, and of the resources themselves. Similar to Apex, supporting teachers in using this curriculum required school leaders develop an intimate understanding of the content, pedagogy, and philosophies embedded within these resources. Again, this was particularly challenging for those leaders working across multiple content areas or in content areas in which they had limited experience.

As described previously, Novel sought to support school leaders in developing their understandings and expertise around the network's instructional resources through hub-provided PD. Yet, given the complexity of these resources, and the leaders' responsibility for supporting multiple content areas, the hub found it difficult to provide effective training to school leaders around these resources. This suggests that while increasing design complexity required school leaders to develop a set of new skills, it also recast the work of hub leaders supporting network members around these more complex designs.

In both cases, new, elaborated network designs resulted in more complex work for instructional leaders as it recast the requisite knowledge and skills needed to carry out this work. Instructional leaders now needed keen understandings of both the content and pedagogy embedded within this set of more explicit instructional resources to support its use in practice. Furthermore, it created more complex work for those in the network supporting instructional leaders to develop the knowledge and skills necessary to support teachers in using instructional resources. Evidence of this phenomenon in these networks is also consistent with existing research on large-scale school reform that suggests as designs become more complex, it becomes beset with more challenges (Cohen et al., 2013).

Directions for Future Research

As described throughout this final chapter, there are multiple opportunities for scholars to build on the theoretical and practical work laid out in this study to advance research on NSI and large-scale instructional reform. In this section, I further detail directions for future research. I begin by outlining a set of research issues I seek to explore as I move forward. I then describe future areas of research for the field more broadly.

Focus on Organizational Learning and Continuous Improvement

A key focus of this study was to analyze network capacity for managing performance. Although I was able to identify key differences in Apex's and Novel's ability to manage performance in their networks, it would be useful to dig deeper into network designs for continuous improvement. In particular, I would like to apply a sharper focus on the established processes networks use for continuous improvement in their networks as this is a critical feature in a network's ability to achieve results and remain competitive in their respective markets. A product of this analysis might include a series of vignette describing particular instances of network-wide recalibration achieved in response to the processes of continuous improvement.

Considering Distributive Leadership

Peurach et al. (in press) identifies distributing instructional leadership as a core domain of building functional educational systems, but this domain was not directly addressed in this dissertation. In fact, considering distributive leadership is an underdeveloped area of research more broadly, particularly regarding empirical and conceptual understandings of executive level leadership in NSI (Peurach & Gumus, 2011).

The networks studied here offer unique designs for how they distribute instructional leadership across its network to support instructional improvement. Applying this core domain to this data could help expand understandings of how networks manage and coordinate instruction across the network. It could also serve to begin building empirical and conceptual understandings of those leading these networks. For instance, one might explore what type of knowledge, skills, and capabilities are most central to leading and managing networks of this sort.

Exploring School-based Challenges

A final future area of analysis includes further analysis of school-based challenges experienced as a result of changing network designs for instructional improvement. I identify earlier in this chapter that increasingly complex network designs recast the work of instructional leaders in these networks, and puts pressure on school leaders to develop new knowledge and skills to fulfil their changing roles. I hope to explore this phenomenon in even more detail to provide more nuance and detail about the ways in which increasingly complex network designs put new pressures on school leaders, and what that means for leaders' day-to-day work. In doing so, I seek to take the vantage point of both school leaders and network leaders, and learn more about how each changed and adapted in response to these changing demands.

Future Directions for the Field

As described previously, the analytic framework put forth by Peurach et al. (in press) offers a useful starting point for analyzing the complex work of NSI. Using this framework allows scholars to begin more systematically wading into networks of this sort to learn about how NSI engage in the critical work of supporting instructional improvement across networks of schools. This study in particular, took up three of five the core domains of functional educational systems (building educational infrastructure, supporting educational infrastructure use in practice, and managing performance). I encourage others to address the other core domains (managing environmental relationships and distributing instructional leadership), and to continue to analyze across all five domains to develop more nuanced understandings of how these core domains function in practice.

I also encourage others to continue to analyze network dimensions as potential explanatory factors of network instructional designs. This study found network structure,

governance, composition, and purpose as having explanatory potential for Apex and Novel's instructional design, however, there are likely more network dimensions that will help to further explain why networks design in the ways that they do. As described previously in this chapter, it is unlikely that any one network dimension will explain network designs, but in looking across a wide set of network dimensions we might be able to build more holistic views of why it is networks design look as they do.

Finally, I encourage others to continue to use comparative case study research to explore NSI. In particular, I suggest others compare across NSI types, including comparisons of CMOs, EMOs, CSRs, non-profits, collaboratives, consortia, and more in order to identify and understand a variety of network models and approaches to instructional improvement. Further, comparing across different market types, including, public, private, philanthropic, and others, could provide more insight into role of different network dimensions that serve to explain these different designs for instructional improvement. In addition to comparing across NSI to identify variations in design models and network dimensions, I encourage scholars to focus on uncovering common phenomenon in the practical work of these networks to build our collective understandings of the challenges, lessons, and achievements of these networks more broadly, and to support those within these networks by building common understandings around network-based instructional improvement.

Conclusion

In this chapter, I have presented a final discussion emerging from the key findings from this study. Through this discussion, I provided a collection of considerations that bears on the theory and practice of networks for improvement more generally. As described throughout this chapter, there is a key theme of interdependence and

complexity that runs through these accounts—both in terms of the work of leading and managing these networks, and in our ability as scholars to understand this work.

In particular, this study explored what scholars identify as three core domains of building instructionally-focused education systems, and tested a set of network dimensions as potential explanatory factors for NSI designs. Empirical evidence from this study finds these three domains of work—building educational infrastructure, supporting educational infrastructure use in practice, and managing performance—hold up empirically as core elements of NSI activity, and serve as a generative frame for studying network designs for instructional improvement. This study also finds that key network dimensions, including network structure, governance, composition, and purpose, help to explain why networks design for instruction and instructional improvement in the ways that it does.

Evidence from this study also finds a key theme of interdependence that runs through these accounts. While the analytic framework used here presents the core domains and network dimensions as analytically distinct features, findings from this study indicate these features are confounded in practice. It finds these domains of practice and network dimensions to be inherently connected, reciprocal, and needing to be coordinated, and suggests that network leaders and scholars give credence to the role of coordination and interdependence when leading and studying networks of this sort. The interdependence observed here highlights the intricate nature of NSI, and suggests that the work of designing, managing, and studying networks of this sort is inherently complex.

CHAPTER 8

Conclusion

I began this study by laying out a central challenge facing U.S. public schooling: how can educational systems organize themselves to support ambitious improvement in classroom instruction, and do so at scale? NSI have emerged as organizational types with a potentially keen(er) ability to organize and manage the work of instruction. In recognizing the potential role of NSI in supporting large-scale school improvement, I explored two NSI engaged in the work of instruction and instructional improvement along two critical lines. The first was to understand how networks organize to support teaching and learning. The second was to begin to identify and examine key elements that bear on how and why networks design in the ways that they do.

In particular, I developed and leveraged an analytic framework for studying NSI designs for instruction and instructional improvement derived from leading research on large-scale school reform and network-based improvement. In empirically testing this analytic framework, the three domains of work studied here—building educational infrastructure, supporting educational infrastructure use in practice, and managing performance—hold up as core elements of NSI activity, and serve as a generative frame for studying network designs for instructional improvement. This study also finds that key network dimensions, including network structure, governance, composition, and purpose, hold up as analytic constructs helping to explain why networks design for instruction and instructional improvement in the ways that it does.

The networks studied here exhibited two different designs for instruction and instructional improvement. Apex's design reflects a highly-specified and fidelity-based approach for improvement. The intended product of this design is a version of instruction that is defined by the network and implemented by network members. The network's centralized structure, authority over member schools, more homogenous composition, and focus on replication of its design in new contexts helped to explain Apex's design for instructional improvement.

By contrast, Novel's design reflects a comparatively less-specified approach that aims to support network members in developing adaptive, classroom-level practices. The intended product of this design is a version of instruction that is informed by the network's vision of instruction, but developed by teachers to meet the needs of their classroom. The network's decentralized structure, limited authority over member schools, heterogeneous composition, and developing design helps to explain Novel's particular approach to instructional improvement.

Evidence from this study also finds a key theme of interdependence that runs through these accounts. While the analytic framework used here presents the core domains and network dimensions as analytically distinct features, findings from this study indicate these features are confounded in practice. It finds these domains of practice and network dimensions to be inherently connected, reciprocal, and needing to be coordinated, and suggests that network leaders and scholars give credence to the role of coordination and interdependence when leading and studying networks of this sort. The interdependence observed here highlights the intricate nature of NSI, and suggests that the work of designing, managing, and studying networks of this sort is inherently complex.

Despite using different approaches for instructional improvement, both of the designs studied here reflect a departure from the contemporary policy logic of standards-based reform.

Under this logic, policies focus on establishing standards and holding schools accountable for meeting those standards. This logic presumed that strict accountability would encourage states and districts to develop solutions to improve teaching and learning in schools. However, scholars argue that these policies failed to offer corresponding supports for instruction through infrastructure and technical guidance that would enable change in practice (Cohen, et al., 2007). Instead, local districts and classroom teachers were responsible for developing the technical resources and guidance to support more ambitious teaching (Rentner et al., 2016).

Apex's and Novel's designs show evidence of offering more robust responses to standards-based reform. While the designs use different approaches, both designs organized the work of teaching and learning using a set of instructional resources and supports to enable a change in practice. Each network's design provided an educational infrastructure, supported the use of that infrastructure in practice, and managed performance in ways that focused explicitly on the technical work of teaching and learning. These more instructionally-focused designs position the networks among a small group of outlying organizations that have designed ways to build policy intentions of standards-based reform directly into the technical work of schools.

Evidence and analysis from this study suggest that networks have done so in the face of great complexity. As illustrated across this dissertation, the work of NSI and instructional improvement is complex and interdependent. It requires managing across a range of domains of practice, as well as managing a set of inherent network dimensions that bear on the designs of instruction and instructional improvement.

Yet in a climate of high-stakes accountability and the press for quick-results, it is unclear whether or not policymakers and others will have the appetite and patience for the type of improvement at scale reflected in the networks studied here. We learn from Apex and Novel that

network designs for instructional improvement evolve over time as they respond to complex challenges. Apex, for instance, has focused on refining its design for nearly 20 years. It started at a single site and iterated its design slowly and methodically over time as it learned from practice. Novel's design shows evidence of slowly developing as it expands into additional areas of support such as instructional leadership, for instance.

The type of deep change in practice that Apex and Novel seek is not a 'quick fix' approach. It requires capacity building across all levels of the network, and requires the networks to learn and grow over time. This slow growth and evolution over time stands in contrast to how many policymakers, philanthropists, and others view improvement in instruction. This disconnect points to a need to reconceptualize how these designs are evaluated for the purposes of funding and endorsement. Instead of focusing solely on student achievement results or other measures of effectiveness, another way to evaluate these designs lies in the network's ability to learn and improve its design over time. This would have evaluators looking at ways in which network designs evolve over time, in addition to other measures of program effectiveness.

While it is unclear how policymakers and others will come to value NSI approaches for large-scale instructional improvement, this study shows the possibility and potential of NSI for improving instruction at scale. Each of the networks studied here organized its designs explicitly around the work of teaching and learning, and did so in ways that supported teachers and school leaders in digging in around complex challenges facing instruction. These designs show the potential for intentionally organizing networks of schools in ways that move beyond the historic decoupling of policy and practice, and towards more instructionally-focused approaches for improvement.

APPENDICES

Appendix A: Network Dimensions as Identified by Educational Scholars

Table 9.1: Network Dimensions, as identified by Russell et al. (2015)

Network Dimension	Description
Composition	The diverse set of organizations (and their expertise) that comprise the network (Gray, 1989; Goldsmith & Eggers, 2004; Oliver, 1990; Wohlstetter, Smith, & Malloy, 2005)
Structure	Nature of the connections between among organizational actors in the network. Includes the level of centrality and density in the network (Huang & Provan, 2007; Provan & Milward, 1995).
Governance/ Coordination	The use of institutions and collaboration structures to allocate resources, coordinate, and control collective action across the network as a whole (Goldsmith & Eggers, 2004; Kahne, O'Brien, 2001; Brown, Hess, Lautzenheiser & Owen, 2011; Provan & Kenis, 2008; Smith & Wohlstetter, 2001; Wohlstetter et al., 2005).
Performance	Attainment of positive network level outcomes that would not normally be achieved on their own (Carlile, 2004; Provan & Kenis, 2008; Weber & Khademian, 2008).

Table 9.2: Network Dimensions as identified by de Lima (2010)

Network Dimension	Description
Genesis	Refers to the reasons and motivations behind the creation of networks and the factors that lead actors to join them (Barringer & Harrison, 2000; Lieberman & Grolnick, 1996).
Composition	Collection of individual actors or collective actors (eg. individuals or schools)
Structure	The level of network density, centralization, and connectedness (Scott, 1991; Wassermann and Faust, 1994).
Density	The extent to which all theoretically possible relations among actors within it are actually activated (Baker, 1992).
Centralization	The extent to which relations and communication patterns within it are centered around one or only a few prominent actors of subgroups (Freeman, 1979; Bonacich, 1987).
Connectedness	Overall unity of the network (Busher & Hodgkinson, 1996).
Substance	Refers to what members interact about: missions, purposes, values, social norms, conceptions, perspectives, among others (Borys & Jemison, 1989; Bell, Jopling, Cordingley, Firth, King, Mitchell, 1996; Carmichael, 2006
Effectiveness	How do we know that this difference is larger than the one that it would make if its members were not organized as a network (Kahne et al., 2001; Bell et al., 2006)?

Table 9.3: Network Dimensions, as identified by Wohlstetter & Lyle (2019)

Network Dimension	Description
Genesis	Refers to the reasons and motivations behind the creation of the network and the factors that led members to join (de Lima, 2010). Many inter-organizational networks in education develop in response to some external push, such as policy initiatives or external funding. Fewer develop as organic systems.
Purpose	Refers to the substance or mission driving the work of the network. Networks in education maintain a central focus on teaching and learning. Network purposes may vary in scope, ranging from a broad focus on increasing educational opportunities for all students to a narrower focus on improving literacy instruction.
Independence	Refers to the network and its relationship with schools or school districts, which can be independent of, yet attached to traditional schools or school districts. Networks offer members an opportunity to work across schools, districts and state lines.
Composition	Refers to the collection of actors within a network and the specific resources they bring to their work (Russell et al., 2015)
Structure	Refers to the set of connections among actors in a network. Network structures vary in the degree of network centrality. Network centrality refers to the extent to which central actors mediate connections between members (Russell et al., 2015).

Appendix B: Data Collected for the Broader Spencer Study

Table 9.4: Spencer Study Data Sources

Data Source	Description
Interviews	71 interviews with 60 individuals, including network staff and personnel at the NYCDOE and those within the networks in our sample. Interviews were semi-structured and each lasted approximately 30-90 minutes in length. Each interview was audio recorded and transcribed.
Observations	Observations of 27 professional learning (PL) events for teachers and leaders totaling more than 100 hours of observation. We used a formal direct observation protocol tool for each of these observations. This instrument captured the activities, conversations, session flow and environmental descriptions in each session.
Document Review	Collected key documents pertinent to network operations and instructional support to be reviewed. Document collection included, strategic plans, intra-organizational charts, contracts, operational protocols and manuals, PD/instructional support schedules and materials, curricula, working documents, memos, website materials and PL materials.

Appendix C: Sample Interview Protocol

Sample Interview Protocol

I. Organizational Structure

1. Let's start with you. How long have you been at [org]? What are your major areas of responsibility, and key objectives?

2. How would you describe the core goals and purpose of the [org]? How are you staffed and organized to carry this out?

3. How many elementary, middle and high schools [and, for BFSC, districts] do you support around C&I? How many Renewal and Focus schools do you have, if any?

4. What have been the major successes in your support for C&I/CCSS? The major challenges?

II. Organizational Supports (Broadly)

5. Who, if anyone in your [org], leads the work on C&I, and CCSS in particular? How does their work fit in with that of the larger org?

6. Have you established key priorities and objectives for curriculum and instruction (C&I)? How were these determined and by whom?
   If not mentioned, ask:
   - Is the CCSS a major focus of this work? How and why, or why not?
   - Are there different priorities at the middle and high schools? What are they?

7. I'll ask you in more detail later, but for now, can you tell me broadly how [your org] is working to support C&I/CCSS in schools? (If more than 3, probe for most significant)
   Listen for, probe if not mentioned: Do you help schools with:

   a. Curriculum and instructional materials, programs or strategies
   b. Tools or other assistance for collecting, analyzing or using data
   c. PD
   d. Coaching

   Do some schools receive or ask for more support than others?

III. Org Supports (descriptive)

8. What is the primary purpose and focus of [support]?

a. Where is it delivered? What takes place in a typical session?
b. Who participates: whole schools, teams, individual teachers or coaches? How are they selected? Do you require participation?
c. How frequently does each school or individual receive this support?
d. Do you require or provide guidance about the processes and routines they should use to implement these new practices in the school?
e. Who pays for this support? Do schools or individual staffs contribute?

A. Organizational Supports (Curriculum)

9. Does your organization encourage or require schools to use particular curriculum resources? Instructional strategies? What? Why those? Where do these C&I resources and strategies come from?

10. Do all of your middle and high schools use the same curriculum and instructional strategies? What major variations exist, if any? Is that a concern?

IV. Organizational Learning

11. How do you formally collect or in other ways receive information about how your efforts are playing out in schools and classrooms? How do you use it? *Listen for,*
    a. Walkthroughs
    b. Teacher Evaluations
    c. Surveys
    d. Leadership meetings
    e. Data Analysis

12. What are some of the lessons you've learned about CCSS implementation in working with schools? Has your approach changed in response? What obstacles do you see moving forward?

V. Nested Organizational Interactions

NYC has a complex system of support for schools, and I also want to understand the role that other organizations play in the C&I/CCSS—specifically, the DOE, the BFSCs and SOs, AGs, and CMOs (name all that are relevant to this respondent).

13. Do you work with other organizations to design and deliver these supports? Do you coordinate with them in other ways? How have they influenced your work?

14. What, if anything, does the DOE require or encourage of your organization around C&I and CCSS? How do they typically communicate these priorities? *Listen for, probe on:*
    - Formal meetings (with whom, about what, how often)
    - Informal exchanges (water cooler)

15. What is the reporting and evaluation relationship between your organization and central? Who supervises/ evaluates who?

16. What is the financial relationship between your org and central? Do you have control over your own budget? Do you pursue external sources of funding? How much autonomy do you have over how money is spent and hiring and firing decisions?

17. What is the financial relationship between your org and schools? How much control do you have over budget and staffing decisions?

Political Landscape for CCSS

18. How have the politics around CCSS influenced your work? How have they influenced your schools?

Thank you for your time.

Appendix D: PD Observation Protocol

PD:
Observation Protocol

1. Name of Event: _____

2. Sponsoring SSO: _____

3. Facilitator(s) of Event:
   Specify position and organizational affiliation, if different from the sponsor
   _____

4. Purpose of PD session:
   Note: Collect official agenda, if available
   _____
   _____

5. Participants at Session

   a. Estimated number of attendees:
      Please collect copy of sign-in sheet or RSVP list if available
      _____

   b. Target Audience (i.e., teachers, principals, superintendents, certain schools, internal/external to SSO, etc.):
      _____
      _____
      _____

6. Brief description of learning environment (i.e., location, size of space, quality of light, sound quality, inclusion of refreshments, etc.):
   _____
   _____
   _____
   _____

7. Brief description of participant arrangement (i.e., small groups, circle/U-shape, auditorium style, assigned seats, mixed groups) _____
_____
_____

	Look fors…	Notes *Supporting quotations and observations; include approx. length of activity where appropriate*
Org. Structures	☐ Presence of leader(s) or facilitator(s) (List all names/positions)	
	☐ Purpose of the session (circle one) Written Stated Implied	
	Facilitator provides leadership or guidance (*Tally each occurrence below*) ----------	
Collective Inquiry/	☐ Participants have time to ask clarifying questions	
	☐ Session focused on teaching and learning	

	☐ Participants discussed instructional challenge(s)	
	☐ Lesson plan study or demonstration	
	☐ Data used when appropriate *(Specify types of data and to what ends they were used.)*	
	☐ Sharing information across schools	
	☐ Looking at student work	

Organizational Embedding, Encoding, and Memory/ Recalibration	☐ Participants practicing new knowledge or skills	
	☐ Protocols used when appropriate *(Specify types of protocols and to what ends they were used.)*	
	☐ Participants agreed upon action items and/or next steps (*Please specify when possible*)	
	☐ Tangible output resulted from session (i.e., lesson plan, protocol, etc., collect if possible)	
	Discussion of how to turnkey best practices (*Tally each occurrence below)* ----------	

	☐ Participants consider how new information from the PD session could be applied to participants' own settings (e.g., school, classroom, grade-level team)	
	☐ Participants indicate change in goals or approach based on data	
	☐ Participants and facilitator(s) use shared language	
Relational Trust	☐ Conversation among participants was generally respectful and tactful	
	☐ Most/all participants contributed	

	☐ Session culture/norms allow for discussion and debate	
	☐ Members share what is/is not working	
	☐ Participants feel comfortable to disagree with facilitator and/or each other	
Goals/Objectives	☐ The session involved creation of or sharing of new goals and objectives Goals were set by: □ Session presenter/facilitator □ Participant(s) □ Both □ Other: _____	

Incentives	☐ The session involved incentives or sanctions for participants to encourage progress towards particular goals. (*Please describe any incentives or sanctions referenced.)*	
	☐ Participants are off task throughout the session. (*Tally each occurrence below)* ----------	
Decision Rights	☐ The following decisions were made or referenced about an approach to CCLS implementation during this session: □ Curriculum □ Pedagogy □ Testing/Accountability □ Upcoming PD □ Budget □ Other:_____ Evidence that decisions were made by: □ Facilitator/presenter □ Participants □ Both □ Other: _____	

Information Flow	☐ The session involved the use of or learning around communication systems. These systems were meant to facilitator communication between: □ School actors and those in SSOs or central □ Actors in different schools □ Actors within the same school □ Other: _____	
	☐ Communication systems used or referenced included: □ Data dashboards □ Feedback surveys □ SSO-based meetings □ School-based meetings □ Newsletters □ Website □ Other: _____	

Appendix E: Coding Frequency Charts

Figure 9.6: Educational Infrastructure Code Frequency

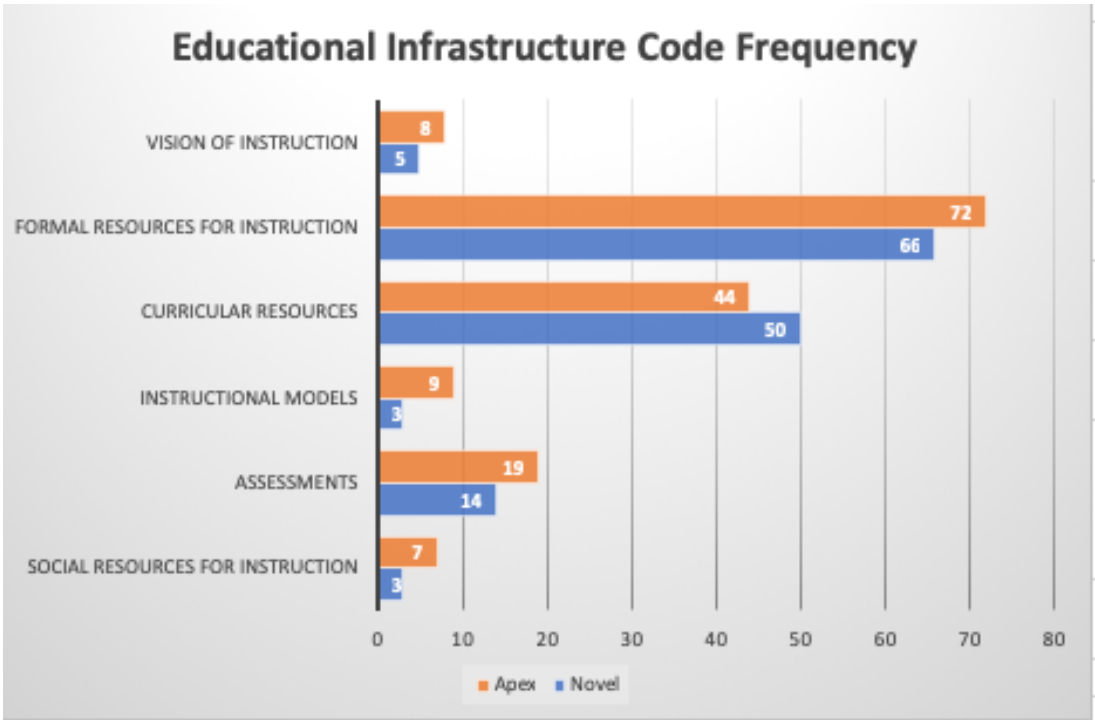


Figure: 9.7: Supporting Educational Infrastructure Use Code Frequency

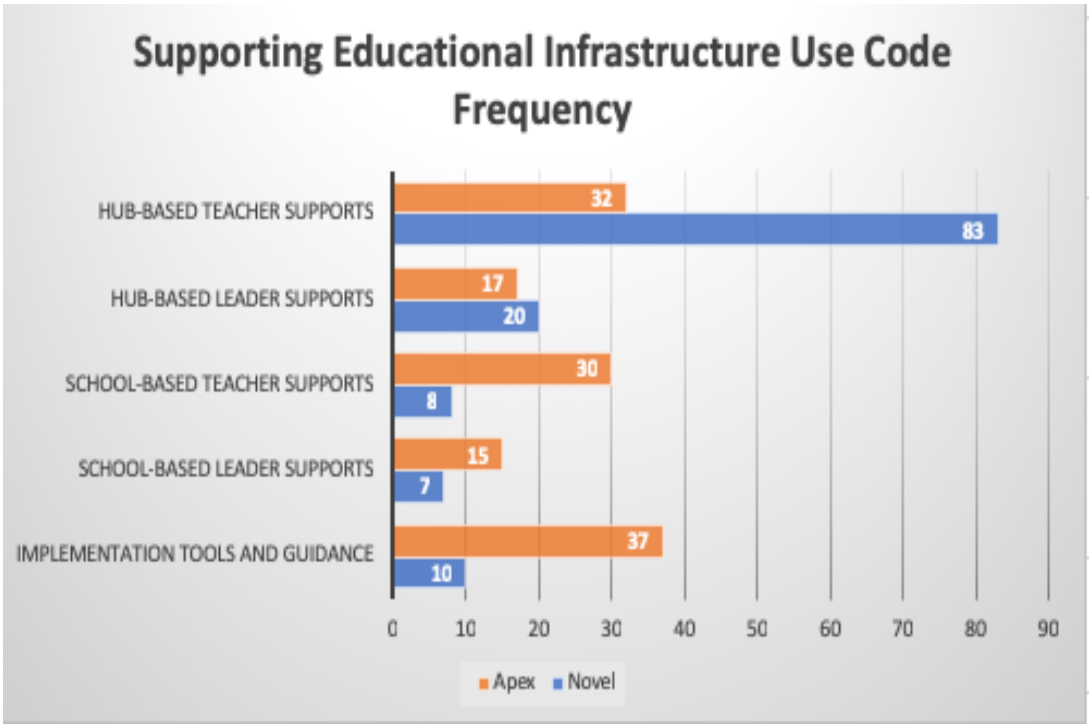
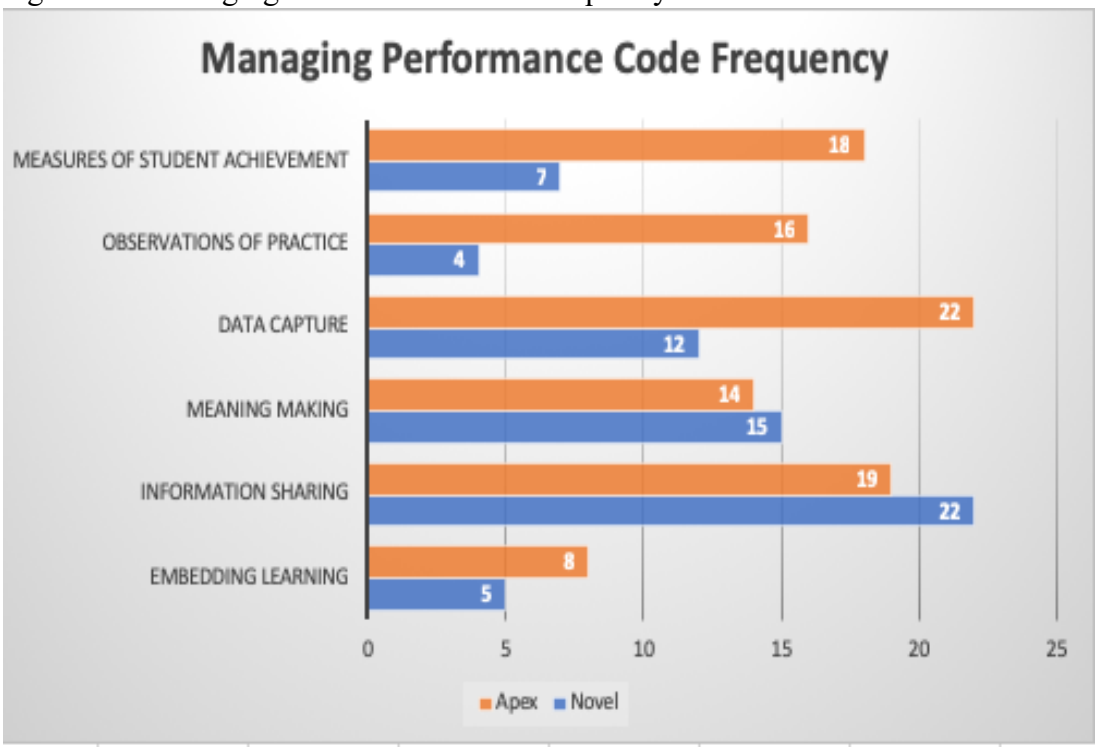


Figure 9.8: Managing Performance Code Frequency



Appendix F: Apex Sample Daily Lesson Plan

Secondary History Lesson Plan			
Name:	Model Lesson Plan	**Date:**	11/28/16
Lesson Type:	**X** Student Investigation □ Close-reading □ -	**Unit:**	Key Concept 5, Reconstruction

This LP template is intended for use after intellectual preparation using the Secondary History Intellectual Preparation Tools (IPP). Find network units at: Middle School, High School.

Scholar Learning Outcomes	**Aim(s)**	Was Reconstruction a success or failure?
	IPP: How does the lesson fall into the overall flow of the unit, connect to major concepts and developments, and work towards the essential questions of the unit?	
	Exit Ticket Task	**Scholars need a full 10 min to complete this ET. Please mind your pacing in this lesson. Consider writing the exact "ET start time" on the board for public accountability.** 1. Write a thesis that clearly and precisely identifies two ways in which Reconstruction failed. Write one body paragraph in which you support your claim about ONE of the ways Reconstruction failed. **Aim to earn the points for evidence use (2 docs), sourcing (2 docs), and additional example.**
	Exemplar Response	**Thesis:** **Reconstruction failed to secure African Americans' rights because it left them vulnerable to economic exploitation and manipulation in the South (A, D). Reconstruction also failed to protect African Americans from terrorism and violence by the KKK and others aimed at manipulating and limiting African American political power (B, C, E).** **Body Paragraph:** **Reconstruction failed to secure African Americans' rights because it left them vulnerable to economic exploitation and**

		manipulation in the South (A, D). In the 1880 Senate Report, Henry Adams reported how he and other freedmen had been persuaded to sign exploitative contracts with their former masters on threat of violence, and then been cheated out of even meager returns (A). Adams was testifying to the Senate. Since he was former slave, his account was a first-hand account of the experience of freedmen after emancipation. In 1935, DuBois named economic pressure as the most important limit on freedmen's lives. He explained that if African Americans exercised their political rights, then they would not get work since whites controlled all of the jobs and land (D). DuBois, writing in 1935, was actively trying to dispel early interpretations of Reconstruction claiming that African Americans were unfit for freedom by laying out the ways in which whites actively tried to prevent their advancement. An additional example of economic exploitation was debt bondage. Contracts like the one Adams referenced often resulted in sharecroppers being tied perpetually to plantations and former owners because of increasing debts, accumulated under unfair conditions.

Time Stamps	**Framing the Inquiry**	**Contextualizing the Inquiry / Empowering Content**	**Close-reading**		**Synthetic Writing with Rapid Feedback / Revision**
			30 min		
			Student Investigation	**Discussion**	
	3 min	7 min	20 min	10 min	10 min

Lesson Plan	**Timestamp**	**What Happens:**	
		Outline procedure, <u>including scripted scholar directions, prompts, and key points</u>.	**Plan for mastery.**
	10 min **Prepare scholars for inquiry with:** **Framing** **Empowering context**	**Scholars complete Do Now while teacher circulates (5 min).** **Do now, please:** Imagine you're writing a DBQ essay on Reconstruction on your AP test and you need to earn the "contextualization" point in your introduction. 1. Set Reconstruction in time and place. When did it take place? You don't need	**CFU's for Empowering Context:** Utilize CFS to the left in whole class debrief and through circulation to ensure 100% achieve the criteria for the contextualization point.

	(These can occur in either order.)	dates here (although they're good too). Where is Reconstruction in the timeline of US history? Can you locate Reconstruction in terms of place? 2. Now connect Reconstruction to other big themes, trends, and processes in US history. What one or two other historical processes are Reconstruction connected to? 3. In 2-3 sentences, earn the contextualization point by contextualizing Reconstruction. (In your DBQ essay, this would come before your thesis in your introduction.) ***SAY: So far in our study of Reconstruction, we've analyzed the conflict between President Johnson and the Radical Republicans over Reconstruction, and we've evaluated the historiography of Reconstruction – the "narrative" or story historians have written – and how and why it has changed over time.*** ***Let's start today by grounding ourselves again in the context of Reconstruction.*** **Debrief Do Now (5 min):** **3 min -** Use show call to highlight the criteria for earning the "contextualization" point on the DBQ essay: ✓ Names a <u>broader historical event, development, or process</u> ✓ Broader event, development, or process is <u>immediately relevant</u> to the question/topic ✓ Uses knowledge outside of the documents ✓ Includes an <u>explanation</u> ✓ <u>Two or more sentences</u>	**CFU's for Reconstruction:** 1. When did Reconstruction take place? *Immediately after the CW (1865-1877)* 2. What were its two main objectives? *Restoring all states to the union, and ensuring the rights of freedmen* **Cumulative Review:** 1. Who were the two US Presidents during Reconstruction? *Lincoln, Johnson* 2. In what important way were their Reconstruction approaches similar? *Both favored a quick and forgiving reconciliation between Northern and Southern states.* 3. How did Radical

		2 min – Revise #3 of the Do Now. Teacher circulates to get 100% to 100% and notes down scholars who need follow-up intervention. **1 min -** Before transitioning, stamp this contextualization review with the model below (in green). This model also ensures that you've clearly defined the substantive concept, Reconstruction. **Reconstruction Contextualization Model:** **Historians refer to the period following the Civil War as Reconstruction. The Civil War marked two major changes in the United States: (1) it broke apart the states into the Union and the Confederacy, and (2) it resulted in the end of slavery and the emancipation of about 4 million slaves. After the Civil War, the nation had to figure out how to restore itself, especially how to bring the former Confederate states back into the union and how to help freedmen protect their new rights.** ***SAY: In today's inquiry, we're going to figure out how successfully Reconstruction achieved this second objective of ensuring the rights of freedmen. At the end of class, we'll practice writing claims that precisely answer the question and defending them with evidence.*** **For Teacher Reference** **From the AP History Rubric:** **CONTEXTUALIZATION: 1 point** **Situates the argument by explaining the broad historical events, developments, or processes immediately relevant to the question.** **Scoring Note:** *Contextualization requires using knowledge not found in the documents to situate t argument within broader historical events,*	Republicans' approach differ? *They wanted both tougher terms for bringing back southern states and stronger federal protection for freedmen.* 4. What are some examples of Radical Republican attempts to protect freedmen's rights? *Freedmen's Bureau, Reconstruction Act (military districts), 13th, 14th, 15th amendments* 5. Why did African Americans lose the representative positions they held during Reconstruction? *Black Codes, violence, economic conditions* 6. Which American historian

		developments, or processes immediately relevant to the question. The contextualization point is not awarded for merely a phrase or reference, but instead requires an explanation, typically consisting of multiple sentences or a full paragraph.	promoted the idea that Reconstructi on was a tragic period because of black unfitness for citizenship? *Dunning* 7. Which historian later challenged this claim? *DuBois, Foner*
	25 min **Inquiry: Student investigation or Close-reading**	Spend the first 5 min. of the student investigation sourcing and analyzing Source A ***with*** scholars. ***SAY: Read the attribution for Source A and underline anything you read that is important to consider when we use this document as evidence.*** Scholars should underline "Senate Report," "Former slave," and perhaps "testified" and "1880." Facilitate a brief burst of discussion, prompting scholars to share why particular elements are important. ***SAY: Now we're going to make our sourcing note in the left margin.*** (Teacher writes on the projector while speaking.) ***Begin with "Since this document is written from the point of view of a former slave…" Since he was a former slave, what can we expect in this testimony?*** (Push scholars to articulate that a former slave would convey the first-hand experience of a freedman.) ***We'll complete this sourcing analysis with, "his testimony is the first-hand experience of a former slave."***	**Back-pocket questions:** **Go-To Sourcing prompts:** 1. What specific information from the attribution is important when considering this source as evidence? 2. If the author is a former slave, what does that mean about what this document is likely to convey? 3. What ***can*** historians learn from it? What ***can't*** they learn from it? (What

		SAY: Now, read the document to yourself. In the right hand margin, jot down the central idea of this document as it relates to the question – did Reconstruction succeed in ensuring African Americans the rights of citizens? While scholars work, circulate and examine scholar work in comparison to this model: **Model Central Idea (Source A):** **After emancipation, whites coerced freedmen into signing contracts in exchange for protection. Freedmen worked for former slave-holders, and were exploited, earning barely enough to survive.** Ensure that 100% of scholars achieve this. Use whole class debrief only if most scholars are off track. ***SAY: Now move onto Sources B-F. Source and analyze these documents using the same margin annotation we used for Source A. Complete this by___.*** (Write end time on the board.)	are its limits?) 4. If this is official testimony before the Senate, what might that mean about this evidence? (Guarded? More truthful? Less truthful?) 5. If this document was recorded in 1880, after the end of Reconstruction, what does that mean about the conditions in which this freedman was likely living? What does it mean about his rights and status? How might that influence his testimony?
	10 min **Discussion**	Scholars should raise three major arguments in their discussion: • Reconstruction failed to secure African Americans' rights because it left them vulnerable to economic exploitation and manipulation in the South (A, D). • Reconstruction failed to secure African Americans' rights because it did not	

		protect them from terrorism and violence by the KKK and others aimed at manipulating and limiting African American political power (B, C). • Reconstruction failed to secure African Americans' rights because the United States government did not commit to strong or lasting federal power to ensure that the states respected the rights of black citizens (E, F). In your facilitation of this discussion, drive scholars toward precise arguments (like those above).	
	IPP: How does the lesson fall into the overall flow of the unit, connect to major concepts and developments, and work towards the essential questions of the unit?	Any additional claims: Additional back-pocket questions:	
	10 min **Synthetic writing and feedback**	1. Write a thesis that clearly and precisely identifies two ways in which Reconstruction failed. 2. Write one body paragraph in which you support your claim about ONE of the ways Reconstruction failed. **Aim to earn the points for evidence use (2 docs), sourcing (2 docs), and additional example.**	**Criteria for success and/or focus for feedback:** ○ Claim that fully and precisely answers the question ○ Clearly connects

			the evidence in two documents to the claim ○ Sources two documents effectively: 1. Goes beyond the attribution information 2. Identifies and important element of HIPP 3. Analyzes the significance ○ Explains an additional example to support the claim

Driving Outcomes	**HW**	**Due today**: read and notes, 434-445 in ***American Promise.*** **Due tomorrow**: Write an LEQ response (timed – 30 min) to "Making Connections" question 1 or 3 on page 447 in ***American Promise.*** Review your work to ensure you've earned all five core points: claim, historical thinking skill, analysis, evidence use, substantiation.
	Differentiation Notes	
	Materials/prep Notes	Scholar handout for class. ***American Promise*** for HW reading and writing.

Appendix G: Apex Fundamental of Instruction

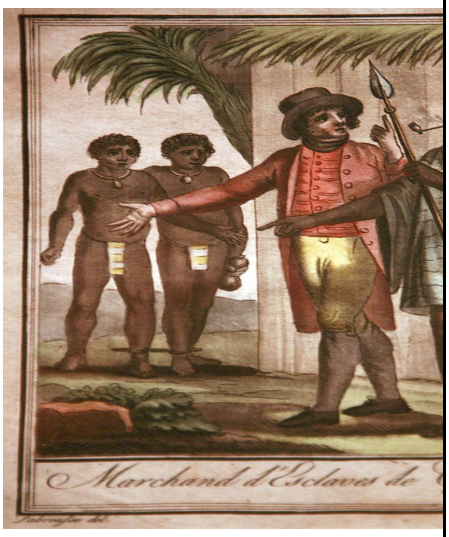
5-12 History: Fundamentals of Instruction			**Inquiry-Based Lesson: STUDENT INVESTIGATION**
Purpose	Employ historical thinking skills to conduct an **inquiry into a historical question** Compose a **sound historical claim** supported by evidence		
Time Stamps	**Framing the Inquiry** — 3 min	**Contextualizing the Inquiry / Empowering Content** — 7 min	**Close-reading** 30 min: **Student Investigation** — 20 min; **Discussion** — 10 min **Synthetic Writing with Rapid Feedback / Revision** — 10 min
Why	**How Long**	**What Happens**	**Markers of Excellence**
Framing the Inquiry: Build strong investment in the day's lesson. Connect the lesson to the broader learning.	3 min	○ T frames the inquiry of the day, clarifying the significance of the question to historical understanding ○ T connects the inquiry to broader concepts taught in the course ○ T clarifies the historical thinking skill for the class Student Outputs ☐ Students can explain the significance of historical question and link it to broader concepts in the unit	**Efficient:** Takes less than 3 minutes. **Purposeful:** Teacher connects the lesson to broader historical study/concept/process and makes the historical thinking explicit. **Builds Investment:** Teacher has enthusiasm and introduces the question in a way that makes it relevant, contentious, and/or consequential, such that scholars exhibit interest and excitement.
Contextualizing the Inquiry / Empowering Content: Effectively and efficiently prepare scholars for inquiry.	7 min	○ T uses read-to-learn, college lecture, HW review, or another means of highly targeted direct content instruction ○ T employs a quick, high impact check for understanding ○ S uses established method to record notes in a notebook or handout Student Outputs ☐ Students write 2-3 sentences contextualizing the topic/inquiry ☐ Aligned to Historical Contextualization CFS	**Strategic:** Explicitly teaches key vocab or other concepts and/or builds schema (via maps, timelines, and other graphic organizers) that will enable scholars to engage in the inquiry. **Sticky:** Makes abstract concepts concrete, vivid, such that scholars can explain them. **Limited:** Takes less than 7 minutes, does not give too much away or extend far beyond the scope of the inquiry. **Rigor:** Requires 100% minds on, demands that scholars do the heavy lifting with the highest ratio method (usually read-to-learn over direct instruction). **Effective:** Effectively checks mastery of key empowering points before moving onto the student investigation.
Student Investigation: Scholars analyze historical documents related to the inquiry of the lesson.	20 min	Teacher ○ Models (or "we") document analysis (G5-G6) and sourcing (G6-G11) until 80% of scholars are meeting Criteria for Success without daily model. ○ Presents exemplar and CFS (when necessary) ○ Provides clear expectations for document analysis (clarifies the procedure, specific scholar work products, timeline) ○ Circulates to gather data ○ Provides Feedback – Either 1-1 or whole group via back pocket questions, direct instruction or show call as appropriate Scholars ○ Source the documents ○ Read and annotate the documents for core meaning as it relates to the question of inquiry ○ Synthesize evidence to develop initial responses to the question of inquiry ○ Revise thinking based on teacher feedback or T+T Student Outputs ☐ Sourcing statements for each doc ☐ Central idea jots for each doc ☐ Aligned to CFS for Sourcing and Evidence	**Clear and Rigorous Expectations:** ○ Provides clear direction, prompt, or scheme for reading/annotation that facilitates scholar thinking, not evidence hunting or simple sorting ○ Provides documents that represent a rich enough body of evidence to make sophisticated claims in response to the central historical question and are edited for accessibility ○ Provides appropriate attribution for each document ○ References exemplars and CFS to ensure clear standards for scholar work **Rapid Feedback and Response to Data:** ○ T feedback focuses on core understanding vs. completion of the task ○ T intervenes with individual scholars or whole class to correct misinterpretation of the literal meaning or sourcing of documents ○ T prompts individual scholars or whole class to drive their thinking toward greater clarity, nuance, and precision. ○ Teacher allows scholars to grapple.

Appendix H: Novel Sample Daily Lesson Plan

1	**What effect did the Enlightenment have on social reform movements in the 18th century?** Objective: Explain how Enlightenment ideas influenced the women's rights and abolition movements in England.

Introduction:

Directions: For each of the groups below, predict how they might have reacted when they read the ideas of the Enlightenment Thinkers.

Women	Supporters of the Slave Trade	Monarchs
		
Source	Source	Source 1, Source 2

How might women react to the ideas of the Enlightenment?	How might supporters of the slave trade react to the ideas of the Enlightenment?	How monarchs react to the ideas of the Enlightenment?

The ideas of the **Enlightenment** sparked **social reform movements** in the 18th century and continue to fuel them today. Two of those reform movements were the **women's rights movement** and **the abolition movement**.

The Roots of Feminism and Women's Rights Movements

Directions: As you read through the information about the Women's Rights movements below, draw a wherever you see evidence of an Enlightenment idea then complete the task that follows.
Throughout most of history, women were treated as inferior to men and those actions were supported by ideas in culture, religion, and law. In 18th century Europe, women were not as educated as men, and they were restricted by laws and customs that made women look to marriage as a means of stability and made them dependent on men. Due to their favored position in society, men were able to excel

Portrait of Mary Wollstonecraft
ca. 1797
Source:
https://commons.wikimedia.org/wiki/File:Marywollstonecraft.jpg

in public life, that is, science, philosophy, religion and politics, while women were expected to marry, have children, and take care of the home.

Using Enlightenment ideas, some women, including Mary Wollstonecraft, argued for more equal rights for men and women. Mary Wollstonecraft (April 27, 1759 – September 10, 1797) was a British intellectual, writer, philosopher, and early feminist. She wrote several novels, essays, and children's books, but is best known for her book, *A Vindication of the Rights of Woman* (1792).

Wollstonecraft argued that all men and women had equal **natural rights**, and that an ideal society could not be realized until everyone was free to exercise those rights. She spoke out against the situation of women in the eighteenth century, declaring that they were educated to be submissive to men and to value physical attractiveness over character and intelligence.

Sources: Adapted from *Social Status of Women in 18th Century English Society As Reflected In a Dictionary of the English Language of Dr. Johnson Karabi Hazarika Research Scholar*, CMJ University, Shillong, Meghalaya
IJCAES Special Issue on Basic, Applied & Social Sciences, Volume II, October 2012. http://www.caesjournals.org/spluploads/IJCAES-BASS-2012-189.pdf; Adapted from "Mary Wollstonecraft." New World Encyclopedia. http://www.newworldencyclopedia.org/entry/Mary_Wollstonecraft

19th and 20th Century Women's Rights and Suffrage Movement in the United Kingdom (England) The writings of Mary Wollstonecraft and others in the 18th century inspired women later in history to fight for equal rights. Women led campaigns to improve education for girls, child custody and property rights, career options for women, and the right to vote (suffrage).	**Identify three examples of Enlightenment ideas in the information and sources about Women's rights movements in the 18th and 19th centuries.**

Leaflet Text:

Australian Women Explain: "Why We Vote"

We Women of Victoria appeal to you, the electors in the Colony, to secure the right that you have won for yourselves RIGHT TO VOTE.

DEMOCRATS !

Remember that Democracy means Government by the People, and not Government by People.

We want the Vote for the Same Reasons You want it !

1. WE ARE TAXED - Taxation without representation is tyranny.

2. WE HAVE TO OBEY THE LAWS - we should have a voice in making the

DEMOCRATS !

Pledge your member to Secure for the of Victoria the same Political Right as Possessed by the Women of South A and West Australia.

A leaflet from an Australian suffrage group from the late 180

Source: http://www.womenworkingtogether.com.au/Images/womenvicvote.jpg

Women's Social and Political Union leaders Annie Kenney (left) and Christabel Pankhurst. ca. 1908

Source:

The Abolition Movement Starts in England

Directions: As you read through the information about the Abolition Movement below, draw a wherever you see evidence of an Enlightenment idea then complete the task that follows.

Soon after the colonization of the Western hemisphere, European countries started importing slaves from Africa to work in mines and on farms in the new world. During the course of the 18th century the British perfected the Atlantic slave system. It has been estimated that between 1700 and 1810 British merchants transported almost three million Africans across the Atlantic. That the British benefited from the Atlantic slave system is indisputable. Yet, paradoxically, it was also the British who led the struggle to bring this system to an end.

Portrait of William Wilberforce, 1794
Source:
https://en.wikipedia.org/wiki/File:William_wilberforce.jpg

Several groups who found the practice of slavery immoral petitioned the British government to stop trading slaves in the 1700s, but It was the **Society for the Abolition of the Slave Trade**, organized in May 1787, that had the greatest impact. Led by **Thomas Clarkson** and **William Wilberforce**, the Society for the Abolition of the Slave Trade organized abolitionists, made speeches, released newsletters, and lobbied politicians to gain support for the end of slavery in the British Empire.

Eventually, in 1807 they were successful in getting Parliament to pass a law outlawing slavery and the slave trade in England and all of the British colonies. While slavery was officially illegal, people of African descent were not yet treated equally.

Source: Adapted from Dr. John Oldfield. “British Anti-Slavery.” http://www.bbc.co.uk/history/british/empire_seapower/antislavery_01.shtml

The Official Medallion of the British Anti-Slavery Society
Source: https://en.wikipedia.org/wiki/File:Official_medallion_of_the_British_Anti-Slavery_Society_(1795).jpg

Let us not despair; it is a blessed cause, and success, ere long, will crown our exertions. Already we have gained one victory; we have obtained, for these poor creatures, the recognition of their human nature, which, for a while was most shamefully denied. This is the first fruits of our efforts; let us persevere and our triumph will be complete. Never, never will we desist till we have wiped away this scandal from the Christian name, released ourselves from the load of guilt, under which we at present labour, and extinguished every trace of this bloody traffic, of which our posterity, looking back to the history of these enlightened times, will scarce believe that it has been suffered to exist so long a disgrace and dishonour to this country.

William Wilberforce, speech before the House of Commons, 18 April 1791

Source: Hansard, T.C. (printer) (1817), The Parliamentary history of England from the earliest period to the year 1803 XXIX, London: Printed by T.C. Hansard, p. 278 from https://en.wikipedia.org/wiki/William_Wilberforce#cite_ref-114

Identify three examples of Enlightenment ideas in the information and sources about the British Abolition Movement in the 18th and 19th centuries.

Appendix I: Apex Arc of the Year

Part of the Arc	Number of Weeks		Dates		Number of Days (with scholars)	
	Site 1	New York	Site 1	New York	Site 1	New York
Core Culture and Academic Foundation	Weeks 1–6 (6 weeks)		August 19 – October 2		32 (includes 8/19 – 8/21)	
Core Course Foundation	Weeks 7–11 (5 weeks)		October 5 – November 6		23	
Thinking & Engagement	Weeks 12–17 (6 weeks) Note: schools needing more time to meet Week 1-11 goals can use this time to bolster those.		November 9 – December 22		32 (includes 11/23 – 11/25)	
CT only: Reset of Core (Core Culture + FOI / Ratio)	Weeks 18–19 (2 weeks)	N/A	January 4 – January 15	N/A	10	N/A
Aggressive Monitoring	Weeks 20–27 (7-8 weeks, depends on breaks)	Weeks 18–25 (7 weeks + 1 week break)	January 18 – March 11	January 4 – February 26	32	33
Crescendo	Weeks 28–34 (6 weeks + 1 week break)	Weeks 26–32 (6 weeks + 1 week break)	March 14 – April 29 State Tests: 5/16 – 5/20 (ELA), 5/23 – 5/27 (Math)	February 29 – April 15 State Tests: 4/5 – 4/7 (ELA), 4/13 – 4/15 (Math)	29	27 (includes 6 days of state testing)
Readiness	Weeks 35–41 (7 weeks)	Weeks 33–41 (9 weeks)	May 2 – June 17	April 18 – June 17	34 (includes 6 days of state testing)	44

WEEKS 1-6: CORE CULTURE & ACADEMIC FOUNDATION

At the end of Week 6, foundational school culture is set and teachers are firmly the captains of their classrooms. This means that

1) Scholars are on-task and possess strong academic habits
2) Every minute of learning is leveraged through tight Common Picture routines
3) Teachers possess the key skills necessary to manage, influence and engage ever child in their classrooms

This is all happening in tandem with rigorous academic instruction. By establishing a warm/demanding environment where teachers hold students to unapologetically high expectations while simultaneously conveying love and support, we set the tone for what joyful rigor will look like across the year. When all of these things work in concert, a foundation is set that leads to unprecedented levels of joy, engagement and learning.

WEEKS 7-11: CORE COURSE FOUNDATION

With a strong culture in place conducive to rigorous academic learning, teacher focus begins to shift to ensure that each class reflects the foundations of the course. Specifically:

1) Instruction is grounded in rigorous content, including questions and tasks that promote depth of knowledge as well as higher order thinking rooted in instructional materials aligned to the college ready bar.
2) Instruction demands that scholars do the heavy-lifting, such that the student thinking and working far exceeds teacher talk and work.
3) Aggressive pacing ensures a brisk start to class that rapidly engages scholars in work, that "brightens the lines and changes the pace" to create the illusion of speed, and that generally adheres to the lesson structures articulated in our FOI's.

Taken together, a focus on the rigor of the content and questions as well as the foundations of pacing and ratio will enable the success of the next phases of the arc, where we focus on making student thinking visible and aggressive monitoring. Conversely, if we fail to solidify a foundation of rigorous content and ratio, successive phases of the arc will be for not. We would run the risk of layering execution of important taxonomy moves on a foundation of clay that would ultimately undermine student achievement.

ARC PART 3: THINKING MADE VISIBLE

The third phase of the arc logically extends the work of the previous phases. Once scholars are on task and focused on rigorous work, the next step is to ensure "all minds on" via a range of accountability moves that make scholar thinking visible: cold call, turn and talk, whole class CFU, show call, and everyone writes. We want to ensure the strategies above are employed throughout every lesson to ensure that scholars are not mentally opting out and truly engaging – such that we increase achievement for ALL scholars. In parallel, as we are engaging all scholars in rigorous thinking, we want to ensure strong discourse and discussion by explicitly modeling and fostering strong habits of active listening, including paraphrasing, re-voicing or augmenting. Over time, teacher reinforcement of these skills should decline as they become habit, thereby producing rich and coherent discussions.

ARC PART 4: AGGRESSIVE MONITORING

With a strong academic and culture foundation in place, coupled with intellectually rigorous instruction, we are uniquely positioned to increase our rate of feedback and accelerate scholar learning. Our feedback should ensure students know where they are, where they're supposed to be and how to get there - this needs to happen effectively with every scholar in every class, every day. To achieve that reality, we build teacher skill in a core set of aggressive monitoring moves - applied to lesson planning and execution. On the planning side, all teachers effectively prioritize what to aggressively monitor for in a given lesson, pre-identify how they will collect data, and what they will do based on the data. In execution, they urgently monitor scholar work, collect data and deliver individual and batched scholar feedback.

ARC PART 5: CRESCENDO

As we prepare for game time, we build on the momentum that's been established via aggressive monitoring to accelerate scholar performance. Our students deserve to show what they know by being prepared to perform their best, not just every day but also on "game day." Doing well under constraints – particularly timed tasks that are challenging – is one of the most important transferable skills our students will need to perform well on even higher-stakes situations, such as SATs, APs, college exams, and most importantly challenging work and life situations. More specifically, we know that building stamina, comfort and confidence with independent, novel tasks (in this case, state assessments) is something our students need. This is not just about academic at-bats. We also believe we can cultivate non-cognitive habits that go beyond any one test, such as effective effort ("I practice, I get better); seeking out feedback; doing my best on all student work; and a desire to improve/re-try. To do this, we increase momentum and focus to optimize scholar learning and performance leading up to "show time."

ARC PART 6: READINESS

During the final portion of the year, school leadership teams shift their attention to planning for the following year. This requires reflection on the previous year and focused attention on articulating a clear vision for the upcoming school year. School readiness work will aim to outline how we use our most valuable resources – talented people and limited time – by defining:

1) Clear roles and responsibilities;
2) Structures; and
3) Systems with a specific focus on a few priority core practices.

This portion of the year will be a time for school leaders to build and refine their skills for training their teachers – an area that will be further addressed during Summer PD.

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