

**Making Sense of Common Core Aligned Mathematics:
Familiar Obstacles and New Incentives**

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THESIS

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LIST OF ABBREVIATIONS

CCSEO	Council of Chief State Educational Officers
CCSR	Consortium on Chicago School Research
CCSS	Common Core State Standards
CCSSM	Common Core State Standards for Mathematics
CGI	Cognitively Guided Instruction
CMP	Connected Mathematics Project
CPS	Chicago Public Schools
IRE	Initiation Response Evaluation
ISAT	Illinois Standardized Achievement Test
ISBE	Illinois State Board of Education
NAEP	National Assessment of Educational Progress
NCLB	No Child Left Behind Act of 2001
NCTM	National Council of Teachers of Mathematics
NCTQ	National Council on Teacher Quality
NGA	National Governors Association Center for Best Practices
PARCC	The Partnership for Assessment of Readiness for College and Careers
PERA	Performance Evaluation Reform Act of 2010
PISA	Programme for International Student Assessment
RTTT	Race to the Top
SIP	School Improvement Plan
TIMSS	Trends in International Mathematics and Science Study

SUMMARY

This research emerges from a new policy environment in which recent linkages among standards and accountability measures aim to focus classroom instruction of mathematics in certain ways. Drawing upon situated learning theory and prior research about how teachers experience policy convergence and make sense of new practice demands, this study examines whether recently linked policies ensure a more uniform policy convergence experience for teachers and encourage teaching consistent with how new student assessments measure mathematical proficiency. In particular, it describes how a single team of middle school mathematics educators, enjoying exemplary professional learning conditions, experienced the convergence of Common Core state standards, aligned student assessments, and teacher evaluation; how these experiences shaped informal opportunities to learn about the three policies; and ultimately the sense they made about related practice demands.

This study relies on qualitative methods, including observations, group and individual interviews, as well as document analysis, to describe policy effects in a high achieving district in Illinois, long committed to collective development of practice for teachers. Findings confirm a continuing relationship among local factors, leader messages, and educators' experiences with policy convergence, that, in turn, shape how observed educators learned about and make sense of multiple policies in professional conversation. In this case, strong and coherent institutional supports for teachers' practice development insulate them from interrogating substantive issues related to new accountability measures. Once more, and despite the more tightly linked policy environment, the extent to which teachers' beliefs and lived experience align with and depart from policymakers' logic model, continue to influence how they make selective sense of new practice demands.

Introduction

Statement of the Problem

Policymakers have sought to influence teachers' classroom instruction for decades, despite even longer-held values for local control of education (Smith & O'Day, 1991). Within a highly fragmented educational context comprised of nearly 15,000 local districts, research across disciplines has found teacher quality critical to student learning (e.g., Darling-Hammond, 1996, 1999; Hanushek, 1971; Kane & Staiger, 2008; Murnane & Phillips, 1981; Rockoff, 2004). Even so, calls for more coherent and rigorous curriculum for US public schools have come in waves, following Sputnik in 1957; the first national student assessment (National Assessment of Educational Progress) in 1969; the publication of *A Nation at Risk* in 1983; and the origination of international student achievement benchmarks with the Trends in International Mathematics and Science Study (TIMSS) in 1995. Reform responses have included content experts' initial development of discipline-specific standards and supporting curricula in the 1980's and 1990's; the No Child Left Behind Act's (NCLB) focus on a "highly qualified teacher in every classroom" and annual measurement of student learning outcomes in 2001; and most recently, the federal government's competitive Race To the Top (RTTT) grant program incenting states' adoption of the Common Core State Standards (CCSS) and incorporation of student learning measures into educator performance evaluations. At the present time, one way to influence classroom instruction is to adopt new mathematics standards (CCSSM) that define expectations for what and how students should learn mathematics, while another way is to institute accountability measures of teacher quality in terms of certain curricular outcomes.

Although curricular standards have been the dominant form of educational reform for the past thirty years (Superfine, 2008), in the past, states had wide latitude to adopt voluntary content

standards in part and on their own timetables, resulting in fifty sets of student learning objectives and incoherent expectations for teaching across this country. With forty-five states' and the District of Columbia's adoption of the CCSSM in their entirety during 2009-10, the advent of nearly national standards for mathematics represents a significant departure from past reforms. Much the same can be said for systematizing teacher evaluation criteria at the state (rather than local district) level, with thirty-five states and the District of Columbia now mandating the inclusion of standardized student assessment results in teacher evaluations (National Council on Teacher Quality, 2015). If separately these policy events represent noteworthy departures from previous reform efforts, then taken together, they indicate an important shift in educational policy direction that rearranges institutional relationships and in turn, the local implementation context.

For both policy strands converge on teachers seeking to understand the CCSSM, enhance classroom instruction for improved student learning, and respond to new mathematics assessments in 2014-15 that may directly impact their professional evaluations and career decisions for the first time (NCTQ, 2015). Researchers, policy advocates, and the public may see new alignments in the current context, but teacher sensemaking of simultaneous systems changes underway remains critical to implementation. In fact, teachers likely interpret changes in standards, student assessments, and evaluation criteria on multiple levels, as learners of new policy implications, as professionals committed to their practice, and as members of broader school communities. Said another way, although the CCSSM and revised evaluation protocols take square aim at teachers' professional practice, to some extent they may also influence how educators learn about curricular developments and reshape interactions with their colleagues about instruction.

Common Core State Standards in Mathematics and Teacher Accountability Policy

A quick review of the evolution of this policy convergence must begin with curricular standards, as both content development and states' subsequent adoption of standards has been contested since 1989. At that time, the National Council of Teachers of Mathematics (NCTM) first published voluntary mathematics standards for K-12 students. Standards, or stated learning objectives, serve as the "intended curriculum" (Ball & Cohen, 1996) that ostensibly guides other curricular forms like textbooks or assessments (Hirsch & Reys, 2009; Schoenfeld, 2013). Hirsch and Reys describe how the intended, textbook, and assessed curricula in conjunction with teacher decisions results in the "enacted curriculum" or actual instruction experienced by students. Relatedly, Polikoff (2012) identifies "the enacted curriculum as the key mediating variable separating educational policies from student achievement" (p. 231). Once more, as teachers learn about refocused mathematical content areas and grapple with practice expectations to support students' deeper learning of that content, they face a barrage of policy signals, public media messages, curriculum questions, and potential conflicts with prior experience or established professional beliefs. In this way, setting curricular standards represents only a first step in influencing what teachers may teach, what textbooks might include, and what may appear on student assessments. In fact, recent policy actions suggest that national standards for K-12 mathematics may be necessary but insufficient for more uniform classroom instruction across a highly decentralized system.

The legislated coupling of the CCSSM, aligned student assessments, and teachers' own professional outcomes indicate a more elaborate logic model. This chain of objectives aims 1) to focus teacher instruction 2) to improve student learning 3) as measured by the newly aligned assessments, 4) so that more students become career and college ready by high school

graduation. At the highest level, policymakers expect newly focused instruction to reduce variability within and among school results. From the perspective of public educational institutions, the arrangement of linked objectives to improve student learning heightens the focus on individual teacher accountability. Long associated with the private sector, performance measurement now plays a central role in public education, endorsed at the federal and state levels (Henig, 2013; McGuin, 2012; NCTQ, 2013, 2015). Individual accountability both represents a concerted move away from a more traditional focus at the school level and serves as additional lever to focus teacher instruction. From another vantage point, states have centralized power over key human resource actions (away from districts) by explicitly linking student assessment performance, teacher evaluations, and personnel outcomes. Again, these shifts in logic and governance stand in contrast to the previously fragmented, localized, and often, independent nature of decisions about what should be taught, what should appear on student assessments, and on what basis should teachers be professionally evaluated. Thus, the current policy context, which the NCTQ (2013) characterizes as a “seismic shift,” (p. i) offers an array of incentives and potential penalties for teachers to pay close attention to the new standards and assessments when making decisions about content coverage and classroom practices.

These emergent conditions prompt the following question: to what extent do tighter linkages shape what local implementers of CCSSM policy now pay attention to when learning about and enacting instructional changes?

Purpose of the Study

Building on twenty years of research findings about teacher sensemaking and obstacles to improving teacher practice, this study contributes timely evidence about how, within a more

tightly coupled policy context, some Illinois middle school teachers make sense of new instructional demands and reconcile their mathematics practice toward the new standards as measured by emerging student assessments. This close-up investigation of how a grade level team experiences multiple policy directions that result in a newly arranged instructional context fits with a Common Core research agenda still very much in formation (Heck, Weiss, & Pasley, 2011; NCTM Research Committee, 2013).

In their helpful categorization of research needs across system levels that addresses both the logic and limitations of more tightly coupled standards (with assessment development, curriculum supports, and professional development) to influence student learning, Heck et al. (2011) state

the CCSSM can be viewed as a set of hypotheses—if the system responds to the standards and mathematics education is provided as the standards expect, then improved student outcomes will result. At the same time, these standards do not encapsulate all that is known or hypothesized to be effective in improving the mathematics education system, so alignment with standards cannot be equated with effectiveness. (p. 24)

These researchers explain that research on the new standards will not be complete without investigating how the standards interact with other factors that influence student learning, like teacher expectations or quality of professional conversations about mathematics. In fact, Heck et al. later raise a specific question that reflects their orientation toward investigating how standards interact with other key factors influencing learning and resonates with my research interests. They ask “how do teachers’ opportunities to learn about (a) the CCSSM, and (b) how to address those expectations, affect the enacted curriculum in their classrooms?” (p.18).

Research Questions

Accordingly, I closely examine how tighter policy linkages among standards, assessment, and evaluation may shape the contours of teachers' opportunities to learn about the practice of mathematics, affecting the types of information to which they pay attention and the aspects of implementation to which they respond. Research questions are as follows:

1. Within informal opportunities to learn about aligning instruction to the CCSSM, how does the convergence of new standards, assessment, and evaluation policy influence how teachers make sense of new practice demands as well as the sense that they make?
2. How do teachers' experiences as learners, professionals, and members of a broader school community influence the sensemaking process and the sense that they make about the new standards, assessment, and evaluation policy?

Theoretical Perspectives

With these questions in mind, this study's conceptual framework draws from organizational behavior, situated learning, and sensemaking bodies of literature to examine how middle school mathematics teachers in a single district interpret and enact CCSSM practice demands both similarly and differently from policymakers' expectations, given new common student assessments and incorporation of assessment results into their evaluations. This descriptive study extends Kaufman and Stein's (2010) analysis of school responses within a single policy environment, centering on how coordinated policy shifts may influence teachers' opportunities to learn about mathematics. Like these researchers and others, I am interested in how teachers, working as a collective, weigh multiple sources of information and various policy interpretations against their own professional experiences and beliefs. Learning as negotiation

reflects an organic process described by Lave and Wenger (1991) that later researchers studying sensemaking in schools, such as Coburn (2001), Spillane and Jennings (1997), and Stein and Coburn (2008) also incorporate.

Study Significance

This exploratory case study aims to describe emerging relationships among policy linkages, teacher learning opportunities, and sensemaking of new standards-based instruction, as well as any observable variations in alignment with linked accountability policies. It sheds some light on how a single team of educators experiences the convergence and divergence of standards, student assessment, and teacher evaluation policies in nearly simultaneous implementation. This qualitative study is designed to add descriptive detail about sources of information educators find most salient in their opportunities to learn about improved mathematics practice and how new evaluation models that determine practice proficiency may or may not contribute to new understanding. Irrespective of the fact that these legislatively linked policy actions seek to influence the act of teaching mathematics, teachers bring various levels of interest to making sense of and rationalize new ways to think about new practice demands. Therefore, I emphasize evidence that suggests how teachers may interpret CCSSM implementation on a personal basis, as learners of unfamiliar concepts and means of instruction; as professionals committed to their practice; and as members of grade teams or broader school communities. This study generates findings about teachers' actual lived implementation experiences, associated sensemaking opportunities, and reconciliation of practice conflicts that suggest future areas of investigation warranting study on a larger and more longitudinal scale.

Study Limitations

The selection of a single, well-resourced, suburban elementary district is not representative of US public education conditions and an abbreviated data collection period further limits generalizability of empirical findings from this study. As a revelatory case, this grade level team enjoys employment in a high demand district that is strongly committed to professional learning about practice and far removed from performance sanctions. As a result, this setting may support teacher conversations about a wide variety of issues related to implementing standards-aligned instruction that student assessments will measure in new and unfamiliar ways, and that may potentially affect teachers' own career professions. At the same time, examining how this team of middle school mathematics educators experience policy convergence in select informal learning opportunities generates timely information about the first nearly national implementation of K-12 content standards and aligned accountability measures. The study's focus on a single team allows for deeper analysis of participants' interpretations of and reactions to multiple policies as they work together to make sense of related practice demands. In the end, the study investigates how teachers experience convergence, identify emerging conflicts with existing practice, craft new coherence, and move instruction ahead in a more complicated policy environment.

The Convergence Of Curricular Standards And Teacher Accountability Policy

The vast majority of states now oversee simultaneous implementation of Common Core state standards (CCSS) and more prescribed teacher evaluation systems. Taken together, curricular standards and strengthened teacher accountability policies shift control of classroom instruction to the states and away from teachers, schools, and districts. This shift simultaneously reconfigures curricular decision-making authority, more uniformly defines quality teaching, and induces teacher practice changes aligned with the new standards and measured according to revised evaluation criteria. Despite the fact that these linkages represent a significant policy development of immediate consequence to millions of educators across most states, history has proven the local context remains the most variable (Cohen & Hill, 2001), resistant to substantive change (Superfine, 2008), and open to interpretation (Spillane & Jennings, 1997). Thus, a fundamental question underlies the logic of linking evaluation results to personnel actions for more standardized instruction as the intended outcome: how well do new alignments and policy intentions at the state level direct actual implementation of improved classroom instruction? For research has shown how educational mandates designed at governance levels once, twice, or three times removed from the classroom often contain some vague and ambiguous language that may be interpreted differently by the intervening levels of change agents (Knapp, 2003; Rowan & Miskel, 1999; Spillane, 1999; Spillane, 2000; Spillane, Reiser, & Reimer 2002).

During implementation, separate policy directions can converge in different ways for teachers, especially if they involve multiple levels of change that represent significant departures from past practice. The coupling and scale of current curricular and accountability policy changes meet these two conditions, thereby injecting systemic uncertainty into school level implementation of new classroom practice and professional evaluation. Said another way,

despite key points of convergence between these two major policy directions, new dilemmas may arise as teachers make sense of curricular change, new practice demands, and more specific evaluation criteria for their own performance. Irrespective of the specificity of new expectations for curriculum coverage or scope of professional responsibilities deemed effective, policy convergence can both complicate and set a series of changes in motion—for teachers, this may mean a reorientation of professional beliefs, the problem at hand, and ultimately, student instruction.

Therefore, as background for this study's exploration into dilemmas for teachers' practice that may emerge from this more tightly coupled policy environment, this section first outlines the separate formation histories of the CCSSM (including aligned assessments) and new evaluation models, both generally and in Illinois, before conceptually discussing policy convergence and new needs for educator sensemaking about potential problems of practice.

Standards as a Central Policy Tool

Curricular standards in subject areas such as mathematics, English language arts, and science have been the dominant form of educational reform for the past thirty years (Superfine, 2008). As a means to ensure more consistent student learning experiences and thereby increase educational equity and adequacy, standards are actually one of the few reform strategies repeated over this time period. Critics of standards-based reform often emphasize this latter point, as successive calls for more rigorous learning expectations and alignment of other educational policies to support improved student learning have not markedly changed educational outcomes nor the nature of classroom teaching (e.g., Cuban, 1993). At the same time, proponents have long noted the power of a national curriculum that the 1983 publication of *A Nation at Risk* brought to

the fore. This report from a presidential commission called attention to quality of US public education and advocated for more rigorous expectations for student learning among a list of reforms. Shortly thereafter, various states like California, Kentucky, and South Carolina developed curriculum frameworks that spelled out expectations for student learning in certain content areas. In 1989, as two national associations of content experts worked to finalize curricular standards for mathematics and English language arts, members of the Bush administration and the nation's governors came to a bipartisan agreement about the need for "national performance goals for students" (Superfine, 2008, p. 26). Both the drafting of curricular standards and action on behalf of federal and state government then represented notable departures from the US's highly local approach to determining what was taught in classrooms. Since then, however, growing attention to comparisons between the US and higher performing countries have continued to highlight the coherence that these countries' national curricula brings to their educational systems (Schmidt et al, 2001; Schmidt, Wang, & McKnight, 2005; Stevenson & Stigler, 1992). By way of illustration, states traditionally enjoyed wide latitude to adopt voluntary content standards in part and on their own timetables, resulting in fifty sets of student learning objectives per subject area and disjointed expectations for teaching across the country (Ravitch, 1996). Correspondingly, researchers like Smith and O'Day (1991) have long found policy coherence necessary but insufficient for meaningful educational reform to take root without related accountability measures.

Thus, standards-based reform efforts and calls for measurable accountability of students and teachers have gone hand-in-hand for more than twenty years, with some researchers finding that curriculum standardization allows for more systematic monitoring of teachers across classrooms (Spillane, Parise, & Sherer, 2011). That said, only now, during CCSSM

implementation, must teachers simultaneously make sense of new curricular demands, enact practice change, and respond to aligned student assessment results that, in turn, impact their own professional evaluations. Thus, two major policy directions now converge on teacher decision-making in the classroom on behalf of students and for themselves as educators.

Formation of Common Core State Standards for Mathematics

With this brief overview in mind, I first describe the formation of the new standards for English Language Arts (ELA) and Mathematics, with the latter serving as a focal point. Discussion herein focuses on the CCSSM because they contain explicit practice as well as content standards: the inclusion of the former dovetailing with my research interest in how teachers make sense of new reform measures and modify their teaching as a result. Unlike their ELA counterparts, the CCSSM begins with a short section on eight teaching practices, written from the perspective of what mathematically proficient students might do to evidence deeper student learning of discipline-specific and grade level content that follows. And yet, these general practice standards stand apart from the more specific content standards, a structural element that some researchers find problematic, as elaborated below.

The list of eight practices to facilitate student learning of mathematics follows a historically rich progression of content-specific research since the late 1980s. Various studies describe effective mathematics instruction as stemming from teachers' deep mathematical knowledge (Ball & Bass, 2000; Ball, Thames & Phelps, 2008; Hill, Rowan, & Ball, 2005; Ma, 1999); deployed in curricular decision-making (Boaler, 2002; Darling-Hammond, 1998); and establishing helpful classroom practices (Spillane & Zeuli, 1999; Yackel & Cobb, 1996) to facilitate student learning. These practices include an emphasis on student problem solving

(Lubienski, 2000) to a greater degree than procedures (Borko, Eisenhart, Brown, Underhill, Jones, & Agard, 1992; Schoenfeld, 2002) as well as the need for teachers to anticipate and negotiate student misconceptions in the course of instruction (Ball, 1991; Lampert, 2001; Sherin, 2002). Although the proposed study's conceptual framework draws from a small slice of findings about mathematics education, for now it is simply useful to recognize that a deep foundation of knowledge exists as background for the CCSSM's inclusion of practice standards.

More broadly, the CCSSM represent the first set of nearly national K-12 standards for mathematics content, despite being the third wave of standards to be adopted in the US. Forty-five states plus the District of Columbia committed to implementing new standards in 2013-14, with CCSSM-aligned student assessments beginning in 2014-2015 in many of these same states (Corestandards.org, 2013). In some ways, the CCSSM build on the prior voluntary standards drafted by the National Council of Teachers of Mathematics (NCTM), and in other ways, they pose a sharp contrast. From a structural standpoint, NCTM's initial standards in 1989 and subsequent update in 2000 were broadly written and philosophical in nature (Schoenfeld, 2007), emphasized skills such as problem solving and reasoning, and arranged content in grade bands. Alternatively, Porter, McMaken, Hwang, & Yang's (2011) analysis of the CCSSM highlights three principles that guide the new "intended curriculum," principles that echo Schmidt et al.'s (2005) earlier comparison of the United States' and high performing countries' standards by way of international student assessments. In particular, Schmidt et al found content standards in higher performing countries: focus on covering fewer topics within a single grade level; limit topic introductions and coverage for coherence; and ensure nationwide rigorous student performance.

Schmidt and Houang (2012) and Wasserman (2011) concur that CCSSM's content focus and learning goal specificity seems to be modeled on countries that perform well on international student achievement tests like PISA and TIMSS. Again, making international comparisons to justify standards adoption is not new, but recent analysis of the number, depth, and progression of the CCSSM against standards of countries with higher performing student achievement measures is a relatively specific way of evidencing academic rigor.

In addition to emphasizing the above principles and new evidence of rigor, Common Core standards differ from prior NCTM-led efforts in both the actors involved in development and timeline to adoption. Firstly, a collection of national assessment experts, educational policy advocates, and state government officials drafted the Common Core standards, rather than bodies of content experts (e.g., NCTM) as in the past. In fact, Achieve, Inc.'s (2008) drafting of Work and College Readiness standards largely established a developmental framework for the Common Core in July 2008. At the same time, Gates, Broad and other foundation grants began flowing in 2007-08 to policy advocates like the Hunt Institute for Educational Leadership and Policy, the National Governors Association Center for Best Practices (NGA) and the Council of Chief State Educational Officers (CCSEO) to foster development of common standards for English Language Arts and Mathematics (Stotsky & Wurman, 2010). NGA and CCSEO officials relied on members of Achieve, Inc., Educational Testing Service, the College Board, state education departments, and select academic researchers to develop national standards aimed at college and career readiness (NGA, 2010). After drafting what became known as the Common Core, the NGA and CCSEO solicited feedback from representatives of national organizations of teachers, college educators as well as from members of the general public (Corestandards.org, 2013) before finalizing the standards in June 2010.

Concurrent with CCSSM development, the US Department of Education announced its Race to the Top (RTTT) grant program, a competitive distribution mechanism for the \$4.35 billion education earmark included in The American Recovery and Reinvestment Act (PL 111-5) passed in February 2009. Nearly a year before the new standards were even finalized, the federal government was awarding up to 70 of 500 possible RTTT application points to states that adopted the Common Core standards in the two subject areas by August 2010. This competitive grant program was novel in its scale and the federal government's requirement of states to undertake specific educational actions in order even to be considered for potential future funding (Superfine, Gottlieb, & Smylie, 2012). The incentive structure, in turn, helped ensure a speedy adoption timetable for CCSS by forty-five states in less than eighteen months' time (since reduced to 43 with Indiana and Oklahoma reversing their decisions). Lastly, this same RTTT category also included 30 additional incentive points for states' involvement in developing and implementing "common" assessments aligned with the new standards.

In addition to RTTT incentives, the Department of Education separately provided almost \$400 million of funding to develop two testing initiatives (the Partnership for Assessment of Readiness for College and Careers or PARCC and Smarter Balanced Assessment Consortium or Smarter Balanced), to which twenty and twenty-five states once belonged respectively (Center on Education Policy, 2013). The original intent had been for two assessments to replace the individual student performance tests in the 43 states and District of Columbia beginning in 2014-2015. States' commitments to administering these two tests have waned over the past few years, with 26 states and the District of Columbia now participating in the two test consortia and the numbers further dwindling for those committed to administering the tests this upcoming year (Ujifusa, 2015).

And yet, analysis shows that when states previously adopted NCTM aligned standards, they drafted student assessments with less than 30% congruence with those standards (Porter et al., 2011). This finding helps explain the crazy quilt pattern of 50 different sets of “NCTM aligned” standards and student assessments with little to no relationship to one another. More specifically, having just two tests is aimed at reducing the “...substantive differences in the content, focus, length, and format of standardized tests used by states to gauge yearly progress mandated by NCLB” since 2001 (NCTM Research Committee, 2013, p. 342). Finally, the two consortia both rely on technology-enhanced tasks to measure students’ grasp of conceptual and procedural mathematics as well as problem solving, reasoning, and modeling practices. With the assessments in their first rollout year, opinions about the quality of the forthcoming test designs range from “revolutionary” (Duncan, 2010) to skepticism that “it will be a challenge for vendors to come up with items that meet these specifications. They are used to writing items for state tests that do not get at this depth of knowledge” (Gewertz, 2012, p. 18).

In terms of accountability, aligned student assessments serve as the linchpin connecting CCSSM standards adoption and teachers’ own performance measurement in the classroom. As just mentioned, nearly all states now require the inclusion of some student growth measures in teacher evaluations and beginning in 2014-15, many intended to replace individual state tests with the two new consortia developed assessments. Since thirty-five states, now mandate “objective student growth measures” in teacher evaluations (NCTQ, 2015 p. 6), the rollout of the two Common Core aligned tests could shortly impact millions of teachers’ reviews in 26 states and the District of Columbia. Incorporation of either PARCC or Smarter Balanced student assessment data in about half the states aims at better standardizing measurement of teacher quality than did thirty-one separately developed tests. In addition, although some states like

Tennessee and Florida have a history of including student achievement data in teacher evaluations, twenty-seven states have chosen to factor student assessment results into teacher performance only since 2010 (NCTQ, 2015). So at a time when many teachers lack familiarity with new evaluation structures that mandate inclusion of student achievement data, any uncertainty about the new assessments' structure, level of rigor, and adherence to CCSSM content should only add to implementation tensions for teachers in the short run.

The Importance of Standards and Student Assessments as Policy Developments

Without a doubt, the move toward nearly national content standards and the concerted creation of two aligned rather than fifty separate student assessments are far-reaching policy developments. At the highest level, a Brookings report (Loveless, 2012) finds both supporting and dissenting views towards CCSSM as philosophical in nature: dependent on whether one favors a greater degree of standardization of educational outcomes, and hence a “national intended curriculum” or continued local control of education. For example, some see the US Department of Education’s RTTT incentive structure for states during a time of great economic need in 2009-10 as following a trajectory of increasing federal direction and state authorization of greater accountability measures (McGuin, 2012; Superfine et al., 2012). More concretely, RTTT provisions ensured that states adopt 100% of Common Core standards to be considered for stimulus funding (US Department of Education, 2009) as opposed to continuing their earlier flexibility to modify and/or omit voluntary standards drafted by content experts. In other words, the federal government’s specific direction and governors’ role in the CCSSM adoption process speak to changing influence patterns in education relative to prior standards adoption. In fact, CCSSM adoption highlights how governance boundaries are shifting among the federal, state,

and district levels, while the influence of assessment and content experts seem to wax and wane in relation to the recent past.

As touched upon above, private foundation funding during the CCSS formation phase enabled working summits that brought together a wide list of partner organizations that included state education officials, private testing interests, and other educational contractors. However, some stakeholders like the representatives of the NCTM, National Research Council, and American Federation of Teachers weighed in on draft standards *after* development rather than help draft them (NGA, 2010). Touted as state led effort by the NGA and CCSEO, the composition of development team suggests strong interest in larger scale assessment and accountability system. In truth, as state entities, NGA's and CCSEO's leadership of standards seems to satisfy the long-held value of local control while increased presence of assessment and accountability interests on CCSSM work teams evidences a newer emphasis on efficiency: e.g., greater alignment between one set of standards and two annual student tests will result in less money spent on curriculum and multiple test development (Newton & Kasten, 2013).

Suffice it say, CCSSM adoption set in motion a myriad of simultaneous system changes. In terms highlighted above, the standards or intended curriculum aim to influence future textbook and other instructional materials development as well as the assessed curriculum, also currently under development. Echoing Smith and O'Day (1991), Schmidt (2012) sketches a multi-faceted relationship between standards and student achievement that includes state-produced instructional materials; professional development, and standards-aligned assessments as key influencers, in addition to teacher practice choices presumably. Given the new policy direction that more tightly link elements such as standards, curriculum, assessments, as well as teacher accountability measures to focus instruction, I will next summarize the structure and

organization of CCSSM content and practice standards as a precursor to discussing probable effects of CCSSM adoption in Illinois.

Comparing CCSSM Content to that of Previous Standards

Research and media attention remains fixed on the content standards for mathematics. In both peer and non-peer reviewed source, affiliates of the CCSS development team (e.g., Achieve, Inc., 2008; Fordham Institute, 2010; Schmidt, 2012) have written extensively and testified in support of the new content standards. Looking more closely at the organization of the CCSSM, content is highly specified within by grade level, incorporating eleven “domain” areas or content strands across K-12. The degree to which the focus and rigor of these new standards compare favorably to existing state standards depends on the state. For example, several recent studies have compared CCSSM to existing state standards (Dingman, Teshner, Newton & Kasmer, 2013; Hirsch & Reys, 2009; Porter et al, 2011). In the aggregate, these studies support a more unified approach to student learning objectives and point to the difficulty of enacting curriculum congruently. More specifically, Schmidt & Houang’s (2012) comparative analysis identified issues with teacher coverage of content stemming from both “sins of omission” –by leaving out topics at a grade level for which the CCSSM calls for their inclusion, and “sins of commission”- by covering topics at a grade for which they are not intended in the CCSSM” (p. 306.) This particular study measures the degree of discrepancy between the intended and actually enacted curriculum. To be fair, other researchers like McGroarty and Robbins (2012) cite Fordham Institute proponents Carmichael, Martino, Porter-Magee, and Wilson (2010) as admitting the new math standards may not improve upon existing state standards in Massachusetts, California, Florida, or Indiana.

Not surprisingly, some CCSSM development team members disagree about the level of rigor (Milgram & Stotsky 2010) and actual degree of content focus (Porter et al., 2011). For example, Milgram (2010) described the standards as putting US students a couple of years behind their Asian peers. Other points of debate center on the level of “improvement” inherent in refocused content – in peer-reviewed (Polikoff, 2012) as well as non-peer reviewed sources (Stotsky & Wurman, 2010; McGroarty & Roberts, 2012). To explain, Polikoff’s dissent results from a content analysis of previous state standards and the CCSSM that showed no real decrease in the level of instructional redundancy by topic. In this study, between 35% and 70% of CCSSM content in an elementary grade level was considered new content with the remainder being review or a re-introduction of topics. In other words, Polikoff finds that implementing the more coherent CCSSM on its face may not reduce the amount of instructional redundancy.

On another level, some researchers point to the limitations of standards to effect meaningful educational change. For example, after recognizing the three reasons CCSS is widely thought to improve educational outcomes: quality vs. previous standards; more consistent rigor across states; and cost efficiencies, a Brookings Institute report (Loveless, 2011) foresees little improvement in student learning on the basis of adopting the new standards alone. Loveless finds simply enacting better organized, more focused, and tougher standards insufficient to instill change, without other systemic changes (e.g., in teacher practice and engagement with materials based on deeper problem solving). This view seemingly follows Cohen and Hill (2001) that the failure of past standards-based reforms have hinged in part on teachers’ inability to instruct for learning growth systemically and their proclivity to “stand and deliver” content to students. Concurring with Loveless’ position in relation to the Common Core, Conley, Drummond, Gonzalez, Rooseboom, and Stout (2011) argue more generally “...content acquisition is a mean

to an end, not an end in itself.... Instruction needs to engage students in challenging applications of key content knowledge” (p. 17). Thus, researchers and CCSSM developers seem to agree both content and practice changes are in order.

Looking at the New Practice Standards for Mathematics

Preceding seventy-four pages of content standards, the CCSSM begins with a three-page description of eight mathematical practices that teachers should employ across the grades and specified content areas. Written from the vantage point of what proficient students should be able to do, this list of practices seeks to ensure “enacted curriculum” experiences at sufficient depth for higher levels of student learning. For this to occur, students must:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically,
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

(Common Core State Standards Initiative, 2010, pp. 6-8)

The standards document states that these practices generally follow principles of mathematics teaching endorsed previously by the NCTM (2012) as well as align broadly with National Research Council recommendations for teaching mathematics (2001). Yet, this spare list of process standards neither lives up to the level of elaborated practice in previous NCTM standards

nor to foundational knowledge about effective mathematics teaching developed by many educational researchers over more than two decades.

From an organizational perspective, CCSSM practice standards stand apart from the content standards. To this point, some researchers who see great necessity of changing teacher practices, also see pitfalls in how the organization of the standards isolates the very general practice standards from the numerous, highly detailed, grade-level content standards (Cobb & Jackson, 2011; Conley et al., 2011; Wiggins, 2011). In his commentary, Wiggins points out the thinness and general unhelpfulness of each paragraph explanation of the practice standards to teachers trying to connect them to highly specified changes in content. In addition, the drafters of the CCSSM fail to describe how these practices might evolve over different grade or proficiency levels. At the most tactical level, the list of practice standards offers little elaboration about mathematical practices that should intersect with content delivery specified throughout all grades. Thus, the new standards' lack of descriptive detail, explicit connections to grade level content, or expectations about student proficiency leaves plenty of room for interpretation of requisite practice changes. The risks inherent in this lack of definition or specificity becomes more apparent when considering some of the prevailing criticisms about prior standards adoption that resulted in little meaningful instructional change (e.g., Cohen, 1990) or student learning gains (e.g., Darling-Hammond, 2004).

That said, in order to move away from general statements about the organization and articulation of the practice standards relative to prior standards adoption, discussion now shifts to a particular state context to highlight more specific grade level content changes teachers must make to their instruction.

Understanding the Effects of CCSSM Adoption in Illinois

Following states' adoption of the Common Core standards in 2010, implementation for state education departments, districts, teachers, as well as textbook and assessment developers began in earnest. State education departments' comparative analysis of previous and CCSSM standards gave rise to new curriculum frameworks to focus attention on new topics, sequences, and grade level expectations for instruction. In Illinois, content coverage is now grade level specific rather than contained within a grade band, with some content moving in and out of grades, and some topics shifting from elementary to high school and vice versa (Carmichael et al., 2010). The specificity of the new learning goals and elaboration of how students should demonstrate proficiency of the goals immediately seems the most pronounced difference from the state's previous standards adopted in 1997. In fact, the Fordham Institute's low rating of Illinois' previous standards for mathematics, that stems from imprecise language, broad grade bands, and calculator use beginning in third grade before sufficient arithmetic mastery, suggests CCSSM's more specifically articulated content by grade and teacher practices are a real improvement (Carmichael et al.).

Comparison of the CCSSM and previous IL standards not only entails examining content shifts within grade level bands but considering omitted and newly added content areas by grade (referenced later as unmatched standards). A focus on unmatched standards points to curricular areas that grade level teachers may have never taught before or have little experience linking to related topics and anticipating student misconceptions. In simplest terms, unmatched standards are more likely *not* a part of a grade level teachers' existing practice. On this basis, practice changes seem more pronounced in:

- kindergarten, with a greater emphasis on comparing and describing objects within a set, addition tasks to 10, and place value to 20 (vs. grades 1-2 in 1997 standards);
- sixth and seventh grades when statistics and probability are taught for the first time (three and four unmatched standards respectively);
- sixth grade which expands previous standards' focus on simplifying arithmetic expressions to include a new emphasis on reasoning and solving one variable equations and inequalities (five unmatched standards);
- seventh grade which emphasizes students' abilities to solve word, mathematical and real-world problems using equations (four unmatched standards) as well as proportionality (three unmatched standards) to a greater extent.
- eighth grade with a greater focus on geometry (vs. grades 6 or 7) and now postpones the use of matrices, some volume formulas, equivalent forms of equations, as well as factoring and graphing quadratic equations until high school.

Thus, the amount of new and rearranged content in grades 6-8 likely adds to middle elementary teachers' learning needs for improved practice of mathematics.

Finally, although research and popular press accounts may once again anticipate tighter coupling of standards, student assessments, and teaching decisions concerning curriculum and practice, history has shown the difficulty of close and consistent alignments among these elements (NCTM Research Committee, 2013; Polikoff et al., 2013; Schmidt & Houang, 2012). It is therefore timely to examine the role of systematizing teacher accountability as a further development along the standards-based reform continuum. In fact, more centralized authority may address prior standards-based reform failures to change classroom teaching (Superfine, 2008) and certainly represents another historical departure from local autonomy, in Illinois and

elsewhere. Therefore, after summarizing changes to educator evaluation protocols in general and in Illinois in specific, discussion will turn to how the simultaneous advances toward a single set of curricular standards and better defined measures of teacher effectiveness represent a form of policy convergence that raises dilemmas for teachers on the ground level of implementation.

Teacher Evaluation as a Policy Tool

Again, as states direct teachers to implement CCSSM aligned instruction, they simultaneously mandate changes to how districts evaluate teachers that in part may influence administrative assessments of teachers' progress in improving their practice in response to the CCSSM. Logically, more prescribed teacher evaluation systems at the state level should affect the reviews and career paths of millions of teachers as well as make the measurement of teacher quality more standard, and therefore more broadly comparable. For policy structure, or the inclusion and priority of certain practice elements, points to how policymakers define higher quality teaching. The fact that a new conception of teacher evaluation originates at the state rather than local level not only shifts traditional governance responsibilities for teacher effectiveness functions but also realigns relationships among system actors and the manner in which local actors get this work done. States' new direction to teachers and their supervisors to engage in certain amounts of and/or approaches to classroom observation, assessment analysis, and reporting seems a prime example of realignment of system roles and decision-making authority for evaluation. How this type of direction may shape teachers' responsiveness to feedback and motivation for practice change seems an open question, especially since new evaluation models now comprise both formative and summative elements.

For the purposes of my argument, what is most noteworthy about this shift in governance is that it aims at greater standardization of what constitutes “good” teaching performance. Stone’s (2002) characterization of policy as a redistribution mechanism is a helpful concept to understand how teacher effectiveness policy has evolved broadly. Teacher evaluations have traditionally revolved around an idea of equality of treatment among members (the old distribution) rather than measuring the value or contribution individual teachers make to student learning (the new). Taking place via negotiated protocols within individual districts, teacher evaluation was historically dependent on local conditions, fragmented at best as a policy element, and lacking much comparative basis, the building block of efficiency (Stone, p. 61). Without much comparability among schools or districts, this arrangement both reflected and perpetuated decidedly local definitions of good teaching. However, over recent decades, ideas about equality and efficiency changed as perceptions of declining teacher quality rose while evaluation practice remained inert. Now, a strong belief in measurability of teacher quality lies at the heart of current teacher effectiveness policy. Moreover, equating teaching with performance aligns with a larger argument about efficiency as a core educational value (Stone) that figures so prominently within the current political environment.

Although new teacher evaluation models, designed for greater statewide consistency and district comparability accordingly respond to loud demands for efficiency, their structure also seems to reflect researchers’ ongoing division of opinion about teacher quality. For example, the range of multiple forms of required evaluation data (e.g., classroom observations and student test scores among others) somewhat attends to educational research concerns about the measurement precision of teacher quality as a construct and recognizes the danger of over-reliance on any single measure. On the other hand, mandating inclusion of weighted student test scores aligns

with economists' view of more "objective" teacher assessments. In addition, for many districts, the inclusion of student test scores or assigning of certain weights to factors like classroom observation in educator evaluations reflects a heightened level of specificity, one that policymakers have imposed to standardize classroom performance of teachers. Although the goal may be to clarify and make expectations more consistent for many teachers, this new specificity represents a marked departure from the way that many teachers have experienced evaluation of their practice and of themselves as professional educators. And the new evaluation structures come at the same time as teachers embark on implementation of new mathematics practices and content changes related to the CCSSM. As such, it seems likely that adoption of new evaluation processes may contribute to practice dilemmas for some teachers who hold competing notions of teacher quality or lack proficiency with new teaching demands.

The Evolution of Teacher Evaluation in Greater Detail

Although teacher governance has long been a power of states, teacher human resource management historically took place at the local school or district level, overseen by other educators, and since the late 1950's, largely within the confines of a negotiated employment contract. Given the thousands of districts across fifty states, teacher evaluation criteria and other effectiveness processes remained inconsistent and highly fragmented. School administrators typically supervised teachers and the teaching of curriculum (Cuban, 1993) while districts specified what constituted "good teaching" through the choice of curriculum as well as by evaluation protocols and ratings established internally. Collective bargaining agreements separately governed human resource decisions such as tenure, re-assignment, or dismissal as well as set salary schedules according to local formulae. Under this arrangement, teacher evaluation seemed only loosely connected to the relatively undefined problem of teacher quality. School

districts developed criteria against which to evaluate educator performance and the prevailing labor contract separately spelled out the processes underlying personnel decisions such as performance remediation.

Practically speaking, however, many teachers experienced neither consistent nor comprehensive performance evaluations (Sartain, Stoelinga, & Krone, 2010). Moreover, many evaluation systems did not adequately differentiate between stronger or weaker teachers since uniform salary schedules aimed for equality of outcomes among teachers and this arrangement traditionally separated occupational compensation from performance evaluation. Over time, policymakers began to see this separation both at odds with how the private sector rewards its workforce and contributing to the problem of teacher quality.

Politically the balance of power over teacher quality began to shift some with the passage of Goals 2000 in 1994 and subsequent changes to the Elementary and Secondary Education Act, both of which encouraged states to further develop curricular standards and related assessment systems. Greater federal direction to states about what to teach was only the first step in consolidating state power over teacher governance, as the passage of NCLB in 2001 spelled out numerous accountability provisions for states, districts, and schools that ultimately influenced what was taught, the frequency of student testing, and the measurement of school performance. For example, only a few states incorporated student achievement measures into teacher evaluations in the 1990s (Millman, 1997). Yet, beginning in the early 2000s, NCLB mandated standardized testing at the state level and technological breakthroughs enabled vast data warehousing and measurement in sufficient scale and detail. NCLB also defined the concept of “a highly qualified teacher” for the first time as the recipient of a bachelor’s degree, certified to teach by the state, and possessing demonstrated knowledge in a respective content area.

However general, this definition centers on measurable aspects of what might constitute teacher quality and as part of federal legislation, does so at a level far removed from both the historical locus of teacher governance and classrooms in which teaching occurs. These pieces of federal legislation began to rearrange longstanding governance relationships at the local level and increase emphasis on measurable aspects of student performance and teacher quality across the states.

Although teaching's historical labor structure may have complicated development of different solutions to defining teacher quality in the past, political interests, public discussion, and a growing body of research began to converge around themes of efficiency and accountability. In fact, a review of literature reveals that economists and other social scientists have long tried to model teacher quality using student outcomes (Hanushek, 1971; Kane & Staiger, 2008; Murnane & Phillips, 1981; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004). Over the same timeframe, educational researchers also wrestled with the concept of teacher quality. As early as 1984, a Rand study described the purposes of teacher evaluation as centering on improvement and effectiveness (Wise, Darling-Hammond, Bernstein, & McLaughlin, 1984) while Darling-Hammond's (1996, 1999) research continued to evolve: focusing on rewarding teacher knowledge, investing in professional development, and enforcing teaching standards. To be fair, some educational scholars pointed to limitations in using student test score models as a stable growth measure of school, let alone teacher quality (Heck. 2006; Linn, 2000; Millman, 1997). Shortly thereafter, Educational Testing Service (Braun, 2005) and business leaders such as McKinsey & Company (Auguste, Kim & Miller, 2010; Barber & Mourshed, 2007) issued widely read reports about the need to add quantitative measures of student learning to teacher evaluation and improve American educational competitiveness respectively. ETS argued for

changes to teacher evaluation policy to make it more “defensible” while the McKinsey reports pointed out that high performing countries monitor performance in inverse proportion to the underlying quality of the system.

Thus, even before RTTT, advances in technology, more frequent student testing, and economic theory had tightened the linkage between teacher quality and performance measures.

The Pace of Teacher Evaluation Policy Changes Quickens

Since 2009, more than thirty-five states have modified teacher evaluation systems (NCTQ, 2015), as RTTT incentivized states to revise to teacher evaluation protocols (McGuin, 2012; Superfine et al., 2012) much like the CCSS adoption strategy. In this case, RTTT guidelines stipulated that states might receive 58 points (out of a possible 500) for improving performance-based educator effectiveness, by way of new evaluation systems that included student growth measures (US Department of Education, 2009). Again, this incentive structure was noteworthy for a couple of reasons. First, it encouraged a shift in control of supervision in service of improved teacher quality to the state level from that of districts. Secondly, it encouraged the inclusion of student assessment results into educator evaluations as well as the use of evaluation-based performance to inform key human resource decisions, rather than length of tenure or other factors outlined in a separate collective bargaining agreement. By emphasizing some performative aspects over others that must be measured in specific ways, an evaluation process privileges a certain way of determining teacher proficiency. New evaluation criteria that come on the heels of new instructional demands and unfamiliar student assessment add further uncertainty as they usher in change.

More specifically, thirty-five states and the District of Columbia Public Schools now require teacher evaluations to include objective measures of student growth, a move supported by a separate but related RTTT incentive for states to invest in longitudinal data systems (NCTQ, 2015). Addressing data systems support briefly, recent technological advances coupled with directed investment into statewide longitudinal data systems allow states and districts to measure accountability at the individual teacher level as well as aggregate classroom and school data for easier comparisons. In addition to propelling states' data collection activities, technology supports help justify performance measurement at a finer grain size. In terms of instructional improvement, a key transition point for these new data systems would be a movement from tracking accountability to using data to guide instruction, still a goal for most districts at this point (Srikantaiah, 2009; White, Cowhy, Stevens & Sporte, 2012). That said, many states and districts now work to enhance data collection/management systems to support new functions like incorporation of student standardized test results into teacher evaluations or expanded district and school comparisons.

Although half of the states mentioned above weight student growth as the "preponderant" factor in teacher evaluations, states' definitions range from Maine that weights student achievement as 25% of teachers' evaluations statewide to 20-50% weighting across Illinois districts to a 50% weighting in Tennessee (NCTQ, 2013). These examples evidence a range of autonomy different states still afford to districts in shaping local evaluation procedures, as does the fact that twelve states and the District of Columbia mandate a single statewide system of evaluation, thirty states provide evaluation guidelines with greater district flexibility, with only half of those requiring state approval of district plans and eleven states employing an opt-out model of evaluation (NCTQ, 2013, p. 20). Without getting into the details of individual state

evaluation policies or data use strategies, for a sizable number of state, new policies and systems resulted in new CCSS student assessments figuring prominently into their teachers' and principals' evaluations beginning in 2014-15 as new Common Core-aligned assessments started to replace individual state developed tests.

In addition to including standardized test scores in teacher evaluations, nearly all the states require evaluations to include classroom observations, and here again take various approaches to implementation (NCTQ, 2013). Some states, like Illinois, differentiate between tenured and non-tenured teachers in terms of the frequency and number of required classroom visits, with twenty-four states and the District of Columbia insisting on multiple observations and most of those also specifying that teachers receive feedback about teaching performance as part of the observation process (NCTQ, 2013). Although states vary in the amount of specific observational criteria and types of professional development support they provide to evaluators, many rely on The Framework for Teaching (Danielson, 2013) as a common evaluation tool. Four domains of activity comprise the foundation of this instrument: planning and preparation, the classroom environment, instruction, and professional responsibilities. Each of these domains includes multiple sub-elements for rating as well as indicators of proficiency that result in one of four levels of practice proficiency per domain (unsatisfactory, basic, proficient, and distinguished). Significantly, many states now structure the classroom observational process (rather than districts) using an established tool developed by a well-known educational researcher. Again, without getting into the details of individual state evaluation policies, this means that many states are phasing in new standards-based instruction, CCSS-aligned student assessments, new data systems, and teacher evaluation protocols nearly simultaneously.

Teacher Evaluation Policy in Illinois

Generally speaking, the purpose of the new evaluation policy in Illinois is to increase the objectivity (Illinois State Board of Education, 2012) with which teacher evaluations measure and reward individual teacher quality, by identifying and weighting evidence categories and setting four uniform proficiency ratings. Among provisions to ensure more consistent practice throughout Illinois, the passage of the Performance Evaluation Reform Act (PERA) in 2010 mandated that student achievement growth measures comprise 30-50% of teacher evaluations and use of a standard four point overall rating. Districts were thereby charged with revising evaluation protocols to comply with the mandated framework that includes measures of student growth, specified classroom observational data, and supporting professional development. Thus, Illinois was among the states that outlined evaluation guidelines for districts, allowing them some flexibility to revise their own models, as well as provided a “non mandatory model” as an option for districts to adopt. This latter option included use of the Danielson framework for multiple classroom observations, constituting a 50% weight in the evaluation, with the other 50% from a menu of student growth measures that must include standardized test scores (ISBE, 2012). More specifically, Illinois directs districts to incorporate results from two assessment types in teacher evaluations. For example, they may choose an externally developed and scored standardized test such as the PARCC or Northwestern Evaluation Association MAP test as well as a teacher constructed performance task at the beginning and end of the school year to satisfy new statute requirements. Summative ratings result from weighted performance across the specified evaluation categories.

So despite ongoing divisions in teacher quality circles about the construct’s measurability, Illinois became one of thirty-five states relying on student test score data as a

significant element (NCTQ, 2015) and instilled the first major change to teacher evaluations in forty years. The state legislature's enactment of Senate Bill 7 in 2011 then coupled educators' summative evaluation ratings and personnel actions such as dismissal, tenure, and recall to streamline human resource decisions, beginning the following school year, 2011-2012 for all districts. Therefore, within a span of eighteen months, RTTT incentivized the passage of two major pieces of legislation, championed by strong advocacy and public support, and Illinois revamped and largely standardized the way in which 866 districts evaluated their teachers (NCES, 2012).

The legislated evaluation framework thus created a "new image" (True, Jones, & Baumgartner, 1999, p. 101) of teacher evaluation policy, placing greater emphasis on professionals' performance measurement in the name of accountability, much like Superfine (2008) described in earlier standards-based reform efforts directed at student learning. In this regard, Illinois' approach does not differ much from other states making evaluation changes. Again similarly, debate initially arose in Illinois about the inclusion of student assessment data to evidence learning growth (and teaching proficiency), with the issue figuring prominently in the rhetoric of the September 2012 Chicago Public Schools teachers' strike (Ahmed-Ullah, 2013; Spote et al., 2013). Although large daily newspapers and the technical press (Darling-Hammond, 2012; Sparks, 2012) may have then discussed the validity of using student test score growth in teacher evaluations, since that time many schools across Illinois began implementing such measures nearly simultaneously with adoption of the new curricular standards and administration of the PARCC assessment.

In truth, both Illinois' relatively weak state-developed student assessments and its highly undeveloped data systems as compared to states like Tennessee, Texas, or Florida, may hamper

its readiness for increased professional accountability (CEP, 2009). In fact, some policy advocates note the state's relatively slow pace of change enactment, since it will mandate inclusion of standardized test growth measures only after the second year of the PARCC assessment and fails to require districts to revamp compensation to reward teacher effectiveness rather than longevity or educational level (NCTQ, 2015). However, as some other states now backtrack on their use of new Common Core aligned assessments, Illinois abandoned its state developed student assessment after the March, 2014 administration, replaced it with the new PARCC test in 2014-2015 (ISBE, 2013), and continues to be among the six remaining states which will administer the PARCC in 2015-16 (Ujifusa, 2015). Finally, although most Illinois districts may phase in student growth measures for teacher evaluations through 2016-17, the Chicago Public Schools began implementing this policy on an accelerated timetable for some teachers and newly incorporating students' PARCC assessment results as available.

Recent Evaluation Experiences Under the New Model

In 2012-13, the Chicago Public Schools (CPS) became the first Illinois district to implement mandated evaluation protocols for non-tenured teachers, with 25% of the weight given to measures of student progress that initial evaluation year, rising to 30% by 2014-2015 (Ahmed-Ullah, 2013). After the first year of implementation, the Consortium on Chicago School Research (CCSR) reports that 76% of surveyed CPS teachers evaluated under the revised system favor the newly structured classroom observation protocols and find them fair and helpful to their practice, while 57% of surveyed teachers report that student test scores comprise too large a factor in the evaluation process (Sporte, Stevens, Healey, Jiang & Hart, 2013, pp. 12, 15). Second year results continued positive teacher trends concerning the benefits of structured, more transparent observations and ongoing feedback about practice (Jiang, Sporte, & Lubbescu,

2015). In truth, recent CPS experience with a new evaluation model points to a range of positive, neutral, and concerning reactions and revisions to practice, but the results remain highly preliminary and largely the experience of teachers in a unique large district.

On the plus side, surveyed CPS teachers welcome the structure and common language for instructional improvement contained in the new observation rubric as well as the opportunity to have multiple professional conversations and/or reflection points about their practice (Sporte et al., 2013). For instance, 75% of surveyed teachers (n=13,620) believe the rubric describes “good teaching,” with slightly higher numbers finding it helps identify practice strengths (81%) and weaknesses (82%) as well as 82% of teachers reporting instructionally focused conversations with evaluators (p.11). However, a closer look at teachers’ responses about features more closely associated with accountability in the new evaluation protocol also raises issues of uncertainty and inequity. For example, teachers’ self-reported concerns about the summative aspects of the new evaluation model seem quite logical given that linking the four proficiency ratings and key personnel decisions represents a large departure from past policy, in CPS and other Illinois districts. Again, an early read on CPS teachers’ experience indicates some level of unfamiliarity and discomfort with incorporating student growth measures in annual evaluations. In relation to standardized test score growth, CPS teachers mention “...the narrow representation of student learning that is measured by standardized tests, the numerous influences on student performance that are outside of a teacher’s control, and an increase in the already heavy testing burden on teachers and students” (Sporte et al., p.16). Other teachers comment on perceived penalties inherent in teaching student populations with greater concentrations of special needs or poverty as well as the mismatch in accountability if they teach non-tested subjects.

Additionally, these Chicago-specific findings seem consistent with feedback from five other Illinois districts using a Danielson-based framework for classroom observations and either piloting or planning for the inclusion of student growth measures in teacher evaluations (White, Cowhy, Stevens, & Sporte, 2012). In this CCSR study, surveyed teachers across six diverse districts seem to accept both major evaluation elements, express some concerns about fairness of a single classroom evaluator, and note the tension between the formative and summative nature of the growth measures in particular.

Taken as a group, the CCSR studies seem to point to varying instances of policy convergence. Initial findings in Chicago may indicate that the new evaluation model supports improved practice, or at the very least, frames more consistent practice for teachers and their supervisors. If the Chicago experiences hold, then a natural conclusion might be that use of the new evaluation rubric indeed helps focus instruction, one of the overall policy goals of PERA. Sporte et al. also point out how the rubric can help provide “defensible evidence” (2013, p.5) for evaluation ratings and ultimate personnel decisions, which pertains to the second piece of state legislation (SB7) that officially coupled these two elements. However, the new evaluation process also sets up potential new conflicts between formative observations and summative performance measurement. Illinois State Board of Education (ISBE) guidelines outline specific steps for observations to encourage feedback about instruction but these same observations serve as input to a teacher’s final rating. For a teacher to self-identify practice weaknesses and ask for instructional help, when such information may contribute to a lower rating and future staffing decisions, seems a mixed incentive at best. Elaborating on concerns about balancing these formative and summative aspects, White et al (2012) note teachers express the need for frequent and consistent communication about the structure and use of student assessment data to set

student learning goals and inform professional evaluations. Under the new evaluation system, surveyed teachers recognize the dual role of assessment data as well as their need for coaching in these areas. In addition, both the Spörte et al. (2013) and Jiang et al. (2015) research indicates that teachers see instructional benefit in designing and implementing a classroom performance task at the beginning and end of the school year but they also understand the potential ease with which to “game” the growth results to improve a summative rating. This raises the possibility of another conflict that may emerge during implementation of the new evaluation system.

Although the foregoing discussion centers on potential issues related to teacher evaluation implementation and only briefly touches upon areas of intersection with the CCSSM and newly aligned tests, the next section more concretely addresses how the convergence of two major policy actions might shape implementation. In order to frame how different examples of convergence may be present simultaneously in Illinois’ newly coupled policy environment, discussion now turns to prior findings about policy convergence that seem quite instructive for today’s implementation context.

Potential Practice Dilemmas As CCSSM and Teacher Accountability Policies Converge

The current set of reforms extend separate streams of policy actions aiming to standardize the American educational experience as a means to improvement that have been the subject of much research over the past thirty years. What’s new about this particular bundle of reforms is that closer coupling of new standards, student assessments and teachers’ own evaluations incents certain practice choices on two levels: toward improved student learning and positive career outcomes for teachers. And yet, compliance with new, expanded requirements may be more easily achieved than actual practice change. For example, it is one thing to factor weighted

percentages of student assessment and classroom observational data into teacher evaluations but the harder task may be to make time for thoughtful (and required) observations, not to mention what may be required for evaluators to gain agreement as to what constitutes strong teaching based on a specified rubric (e.g., Danielson framework). For these activities may be new (and confusing) to both the observing administrator and the observed teacher alike (Sporte et al., 2013). Looking broadly across districts, if in the past most teachers have failed to receive consistent and comprehensive evaluations, then the likelihood of these same teachers having enjoyed structured professional observations with actionable feedback from their supervisors also seems quite low.

Policy Convergence in Concept

The convergence of multiple policy directions creates instances of both continuity and discontinuity for educators: different measures seek to influence instruction by creating new demands for practice amid highly specified evaluation criteria, new personnel ratings, and potential “high stakes” human resource outcomes, that contrast with most educators’ experience. However reconfigured the current implementation context may seem, at the outset there is little to suggest that teachers should experience policy convergence in markedly different ways under this set of educational reforms. To begin, scholars have viewed policy convergence in varying ways, whether resulting in incoherence as a school level outcome (Fuhrman, 1993) or as ongoing process of creating coherence (Honig & Hatch, 2004). Knapp, Bamberg, Ferguson, and Hill (1998) make a more specific process argument that educators may experience convergence of multiple policies in at least three ways, “mutual reinforcement,” “interference,” or “cumulation and overload” (pps. 400-401). In fact, Knapp et al.’s description of three forms of policy convergence helps map out a probable range of expected conditions as teachers simultaneously

engage in policy changes related to the teaching new curricular standards, implementing new student assessments, required reporting of new student learning data, and undergoing new professional evaluation procedures.

Written from the perspective of teachers, Knapp et al. (1998) outline three common effects resulting from policy convergence: *mutual reinforcement* occurs when “different reform streams may enhance one another by offering complementary resources or new approaches to different aspects of the task faced by frontline professionals; *interference*...” (p.400) may ensue if instead the different reform streams include objectives or give rise to consequences in opposition to one another. *Cumulation and overload* often occurs in US public education when several initiatives are implemented together or on top of one another without much prioritization. In this description, Knapp et al. move beyond the positive connotations of the term convergence signaled often by “mutually reinforcing” outcomes, to the last two situations in which educators may experience conflicting demands on their time that add to their workload. These researchers find these latter two effects can help diffuse teachers’ professional sense of purpose.

Although there may be other outcomes to consider, this three-path convergence model still seems applicable for understanding teachers’ experiences in the current implementation context in a few general ways. For example, policy advocates for recently reconfigured governance relationships and design of aligned curricular and teacher effectiveness policies view them as necessarily “mutually reinforcing” to improve teacher instruction. In fact, Chubb (2012) and The New Teacher Project (2013) among others make this very argument in reports about adoption of the Common Core, decades after Smith and O’Day did (1991). Other early implementation studies of new evaluation systems suggest potential areas of both mutual reinforcement and interference. Regarding the former, Sporte et al. (2013) and White et al.

(2012) report teachers find the structure of new evaluation rubrics, definitions, and concrete measures of student growth helpful to understanding expectations for “good practice.” At the same time, these CCSR studies identify these same teachers’ concerns about the balance of accountability and practice growth potential, conflicts raised more broadly by Goe, Bell, and Little (2008) and Mead, Rotherham, and Brown (2012). In addition, the NCTM Research Committee’s (2013) review more narrowly points to “a critical research area involving teachers’ knowledge, beliefs, orientations, and practices related to assessment” (p. 348). Thus, uncertainty over the ultimate alignment of the new student assessments and the CCSSM resurrect historical concerns that teachers may be conflicted between teaching according to the new standards or to obtain strong student assessment results.

As a practical matter, the overlay of new standards, student assessments, and evaluation processes that require many educators to revise teaching practices seems a plausible case of overload now and in the near future. Enacted independently, these policy directions likely foster some unintended consequences while nearly simultaneous implementation may create others in combination. For no matter how well designed or implemented major educational policy initiatives may be, during implementation, convergence may result in any one or all of the outcomes described by Knapp et al. depending on the level and unit of analysis. Although my argument ultimately centers on practice dilemmas faced by teachers in a newly convergent environment, these dilemmas do not necessarily represent the only instances of policy interference or overload. For the weight of “mutually reinforcing” policies pertaining to standards, aligned student assessments, and coupled professional evaluation can pose pressing practice dilemmas for teachers as well.

For analytic purposes, rather than viewing teacher responses to multiple practice demands from converging policy initiatives as sporadic or inconsistent, it seems wise to heed Leatham's (2005) call to view teachers' beliefs and actions as "a sensible system" (p. 91), guidance also suggested by Davis, Choppin, MacDuffie and Drake (2013). To this end, it is important to clearly identify competing demands or conflicting influences teachers now face changing their practice in a new policy environment. To be clear, some potential conflicts appear rooted in either CCSSM adoption or teacher evaluation, while others arise where the two policies overlap. In fact, identification of new practice dilemmas that may arise from tighter relationships among standards, student assessments, and available curricular choices illustrate potential problems of convergence. The following list of potential dilemmas points to a need for more information about how teachers interpret and respond to disparate levels of specificity for CCSSM content and practice standards in relation to their own experience, beliefs about practice, and uncertainty about new "high stakes" evaluation demands.

Potential dilemma – How might teachers recognize gaps in their mathematics practice? Neither new nor unique to the adoption of the CCSSM, this dilemma largely stems from the curricular reform's goal of practice improvement to support deeper student learning. Yet, it is also fundamental to policymakers' decision to align student measurement of the new standards and teacher evaluation outcomes, as ways to ensure both practice change and student learning gains. Prior research has well documented the difficulty of teacher practice change within past curricular reforms (e.g., Cohen, 1990; Cohen and Hill, 2001; Darling-Hammond, 2004; Spillane and Jennings, 1997). And more recent studies related to the CCSSM point out the increasing insufficiency of teachers "standing and delivering" weak or disorganized content. These studies concur that CCSSM practices represent an important but difficult step forward for

mathematics instruction, highlight the need for explicit teacher learning opportunities for improved practice, as well as raise concerns about teachers' ability to recognize areas in their own practice needing improvement. At the same time, new evaluation systems' reliance on classroom observations and aligned student assessments to determine professional performance aims to incent more proficient teaching and higher student learning measures.

In a more recent study, Mosher (2011) contrasts the mathematical practices outlined in the CCSSM and historical reliance on standards-based curricula that specify the order and sequence of particular topics. The CCSSM approach demands greater teacher knowledge of students to ensure learning growth than simply delivering content. Consistent with a perceived need for dramatic practice change under the CCSSM, this research brief calls attention to how teachers too must undergo a learning progression about the new standards in order to facilitate a deeper, problem-based form of learning for students. Mosher's analysis points to a critical need for teachers to notice deficiencies in their own practices as a precursor for instruction that lives up to the CCSSM's content and practice standards simultaneously.

In fact, other researchers explicitly consider the list of CCSSM practices the most important element to improving student learning and the greatest challenge to improving teachers' instructional decisions. For example, a Gates Foundation funded report summarizes post-secondary educators' beliefs that the eight practices are most in need of adoption, asserting they are most central to college and career readiness (Conley et al., 2011). In addition, Cogan, Schmidt, & Houang, 2013 find that nationally surveyed teachers relish a more coherent and focused group of content standards to guide instruction across schools to improve learning opportunities for all students. Yet this same study also suggests that many teachers misunderstand the magnitude of practice change CCSSM adoption implies: only about a third of

surveyed teachers say they need better preparation on mathematical content they currently teach. Moreover, about twenty percent of these educators report not teaching certain CCSM content, yet still feel well prepared to do so (p.11). In another survey involving a smaller subset of middle school mathematics teachers, Davis et al. (2013) reaffirm that teachers understand the inclusion of the practices as innovative yet still see student learning as contingent on learning content first, which aligns with Floden's (2001) earlier findings that the content that gets taught is more easily changed than how such content gets taught.

More narrowly still, if Illinois teachers' attitudes toward the new standards follow those of a nationally representative sample of teachers (Schmidt, 2012), then Illinois teachers also likely discount the degree to which math standards have changed. In 2011, this survey revealed although most teachers in the state had heard of and "liked" the new standards (90%), after reading sample topics, around 80% then found them "pretty much the same as their former state standards" (Schmidt, pp. 6-7). Moreover, this same sample of math teachers expected the threat of a lack of parental support (49.7%) to far outweigh teachers' own lack of needed mathematics knowledge to enact the new standards (15%). Yet, without knowing if and to what extent a current sample of Illinois teachers might deviate from these national findings given the discrepancy between the "weak" Illinois math standards adopted in 1997 (Porter et al., 2011; Schmidt & Houang, 2012) and the "vastly superior" CCSSM (Carmichael et al., 2010), what we do know from the national survey is that a subset of Illinois teachers indicated various feelings of preparedness to teach the new standards. Sampled Illinois teachers report feelings of preparedness ranging from a low of 41% in grade 4 to a high of 68% in grade 8 (Cogan et al, 2013), despite a concentration of new CCSSM content at the higher-grade level.

As a group, these studies surface the need for teachers to move beyond recognizing the magnitude of state specific content shifts on paper, toward a deeper understanding of widespread expectations for dramatic practice change in classrooms. Since awareness of a potential practice gap or discrepancy logically precedes enactment of meaningful instructional change, the above teacher self-reports may indicate some degree of implementation challenges, nationally and within Illinois. Moreover, if teachers' assumptions turn out to be overly optimistic about the ease with which they will improve instructional practice according to the CCSSM, then both student learning and teachers' own career outcomes may suffer. The latter outcome is precisely the intent of policymakers' mandated incorporation of aligned assessment data in teacher evaluations. To what extent this new coupling of student achievement data and teacher personnel decisions directly incents teachers toward improved mathematics practices and/or instruction that raises student test scores remains to be seen.

Potential dilemma – How do revised evaluation protocols address CCSSM practice changes? This dilemma gets to the heart of an implicit assumption underlying the logic model for coupling standards adoption and new evaluation systems to incent different mathematics practice—that evaluation structures and measurements will align with and therefore, incent practice changes demanded by the CCSSM. Classroom observations and student learning measures now comprise the two major inputs to teacher evaluations, so alignment among observational protocols, student assessments, and the CCSSM seems critical. From a student learning perspective (e.g., Norton & Boyce, 2013), enacting the CCSSM revolves around deepening teacher practices like modeling mathematical concepts and engaging students in problem solving, reasoning, and using structure. Again, CCSSM assessment developers agree as the new consortia assessments aim to measure teacher practices via select student results (NCTM

Research Committee, 2013; Schoenfeld & Kilpatrick, 2013). However, even at this early stage of implementation, some evidence pokes holes in the idea that new observation protocols and yet to be finalized student assessments will motivate teacher practice changes at a deep enough level to improve student learning.

Thinking about teacher observations first, the decision of which evaluation model districts may use resides with the states, with many districts using a form of the Danielson framework (2013). In spite of assertions that this latest version of the instrument includes concepts underlying the Common Core like “deep, conceptual understanding” (Danielson, p. 110), the observational rubric is content neutral and therefore, may not address critical mathematics specific practice elements necessary for effective Common Core aligned instruction (The New Teacher Project, 2013). This means that despite Sporte et al.’s (2013) encouraging early findings that surveyed CPS administrators (n=621) indicate that more than four in five teachers made “noticeable improvements” in their teaching under the new evaluation system (p. 10), use of the new observational rubric may not translate into stronger mathematics instruction. Said differently, an inherent obstacle to meaningfully improved practice may be the evaluation framework’s focus on general elements of classroom proficiency, rather than particular strategies to ensure “productive disciplinary engagement” (Engle & Conant, 2002, p. 399) in mathematics. This mismatch in practice specificity could be a pivotal consequence of how the new standards and new evaluation policies converge and one that merits investigation within this proposed study. Moreover, and as noted previously, much uncertainty surrounds the effectiveness of significantly weighting student achievement results as a way to motivate teacher practice change. For mathematics teachers, this policy element obviously is highly content specific, yet some

researchers question test makers' ability to construct student assessments that accurately measure both learning and teacher practice levels (Gewertz, 2012; NCTM Research Committee, 2013).

To explain, newly aligned student assessments will revolve around problem solving, abstract reasoning, and mathematical modeling practices to a degree that, if a student was only exposed to procedural knowledge, he or she would be unable to perform the required tasks in the time allotted. This logic suggests that such an outcome would point (indirectly) to insufficient teacher practices. Yet, it seems reasonable to wonder to what extent will new annual student assessments constitute valid measurement of individual teacher practice. For example, Schoenfeld and Kilpatrick (2013) note that the two assessment consortia (Smarter Balanced and PARCC) will assess students on only the first four of eight mathematical practices. Thus, teachers will not receive even indirect feedback by way of student assessments on the use of mathematical tools, attending to precision, the use of structure, and repeated regularity in reasoning. Lastly, using student assessment data to measure the strength of teacher practices indirectly poses one potential measurement problem that may be compounded by the fact that the two consortia assessments will survey only half of the eight mathematical practices.

Correspondingly, the NCTM Research Committee (2013) argues "research is needed on the capacity of formative and summative assessments to measure the Standards for Mathematical Practice in valid and reliable ways" (p. 347). Thus, whether PARCC, Smarter Balanced, or district designed student assessments will evidence the prevalence or effectiveness of teacher practices appears an open question at this time (NCTM). Said another way, using student performance data to judge teacher effectiveness may follow the very recent precedent set by many states coupling educator personnel decisions with teacher evaluations that are partly determined by student assessment results. However, using student response patterns to suggest

the evidence or absence of particular teaching elements in the past year seems a new inferential leap.

Thus, the coupling of teacher evaluation structure and significant mathematics practice change demanded by the CCSSM may not be as “mutually reinforcing” as policymakers and the public expect. A few major policy levers operate nearly simultaneously in the current educational context. The institution of new evaluation measures, curricular standards, and student learning assessments complicates isolating the effects of strengthened practice on student learning that result from any single policy element. Therefore, it may be difficult to pinpoint the source(s) of implementation weakness: teachers’ lack of revised practice may be reinforced by general observational rubrics used to assess instruction; or their inability to recognize new practice demands from the CCSSM, or a lack of familiarity with how new assessments measure students’ grasp of standards-based knowledge.

Potential dilemma: How might uncertainty over new student assessments factor into teachers’ opportunities to learn? With the initial fielding of new student assessments expected in 2015, many teachers will have little if any actual experience with them on which to draw. What they likely have experienced in the past, is a sizeable lack of congruency between prior standards and student assessments, with less than 50% and sometimes as low as 20-30% alignment between the two (Polikoff, Porter, & Smithson, 2013). Not surprisingly, analysis of recent state and federal accountability policy effects on Illinois classrooms (CEP, 2009) indicates that when sampled teachers perceive a mismatch between previous state standards and annual student tests, confusion results whether to teach to the test or to the standards. When teaching to the test, teachers report relying on teacher-led discussion and closed questions using practice test items to prepare students (CEP). A logical response to assessment and accountability

mechanisms previously in place, this form of teaching exemplifies “lower order” learning skills and seems clearly at odds with the CCSS mathematical practices.

In fact, maintaining this teaching strategy will likely be unsuccessful going forward, especially if the newly aligned tests live up to the promise of measuring students’ deeper conceptual thinking vs. more procedural skills. As CCSSM implementation gets underway, teachers self-report favoring lower order mathematics skills in their classrooms vs. those practices called for by the new standards. Porter et al.’s (2011) survey of 1,536 mathematics teachers (including a subset from Illinois) reported that teachers emphasized students’ memorization for nearly 25% of annual content (vs. 10% required in CCSSM) and double the amount of conjecturing (14% vs. 7% in CCSSM) that comes at the expense of requiring higher order “demonstrating understanding” skills (p.114). These findings suggest that a significant practice gap exists for surveyed teachers, whether or not the new tests are better aligned. Should the new student assessments be well aligned with the CCSSM, then teachers’ under-reliance on higher order mathematics could limit student learning gains as well as jeopardize their own evaluation outcomes.

These findings, and hypotheses drawn from national survey samples, underscore the risk for some teachers who consider past practice choices sufficient in response to the new standards and professional evaluation structure. They also seem to reinforce policymakers’ goal of designing student assessments to measure student mastery of the CCSSM and hold teachers accountable for necessary practice changes. However, until teachers know how this goal translates into actual student assessments, some uncertainty about what and how to teach is likely to prevail. Whether this uncertainty motivates teachers to reconsider their practice more carefully or rely instead on familiar and true elements from past experience may become evident shortly.

Potential dilemma – How might the dual nature of new evaluation procedures, including both formative feedback for improved practice and a summative performance rating, shape teachers’ opportunities to learn? For the time being, implementation of new evaluation models touted as both learning and improvement tools for teachers may be a tricky exercise. As implementation gets underway, both those supervising and those making use of new policy elements in the classroom may be somewhat unfamiliar with expectations and requirements. Moreover, the newly standardized design of evaluation means that one process will now result in both formative performance feedback and a “high stakes” summative performance rating for teachers. Combining these two forms of assessment with separate and distinct purposes may initially complicate the experience of those reviewed (Sporte et al., 2013) as well as those reviewing under the new system, since career consequences now accompany the final rating in most states. Whether such conditions create confusion, help foster some productive professional dialogue, or some of both, remains to be seen on a large scale.

On the one hand, preliminary single district studies about new evaluation system implementation indicate that most teachers require assistance to understand new observation rubrics, the use of student growth measures, and their potential influences on both professional development and employment decisions (Jiang et al., 2015; Sporte et al., 2013; White et al., 2012). On the other hand, educators’ experience with formative feedback appears promising. For example, in their recent study of Chicago Public Schools’ experience with a new evaluation protocol, Sporte et al. (2013) assert, “clear descriptions of quality instruction help teachers transcend their own individual opinions about teaching and begin to compare their practice to others” (p.11). Changing teachers’ conceptions about what constitutes good practice and encouraging them to think systemically about how their individual practice might relate to their

school or another unit larger than their own contained classroom certainly seems a favorable step forward. Moreover, a majority of CPS teachers report they appreciate feedback on their teaching and find the feedback they receive is useful under the new system.

In the same study, however, some teachers describe their reticence to bring up weaknesses in their practice for fear it will negatively impact their proficiency rating. Said another way, surveyed teachers see both the utility of observational feedback to improve their teaching and the risk of asking for help if that request results in a lower rating (and potential negative career consequences). Relatedly, Spote et al. conclude that evaluation systems that rely on a single administrator both to rate the teacher and provide instructional feedback “may undermine the learning potential of the observation process” (p. 13). Unfortunately, constraining the learning potential of the experience may hamper both a teacher’s ability to improve his or her practice according to the CCSSM and potential student learning of mathematics.

In sum, these four dilemmas illustrate some potential problems of convergence. Although hardly exhaustive, this list of potential practice issues raises some over-arching questions related to teachers and their need to reconcile competing and complementary demands for instructional change in mathematics. What pressures and incentives for teacher practice choices ensue with nearly concurrent implementation of new standards and aligned student assessments currently under development, the latter of which also newly linked to teacher evaluations and key personnel outcomes? How will teachers respond to the absence of first-hand experience with newly aligned and differently administered assessments in early implementation? How will teachers experience evaluation of their practice: as a means of

developing greater competency as a math educator and/or a summative documentation process to be managed for career success? These sets of questions fundamentally shape this study, as they comprise the core of my research interest in how teachers make sense of complicated and inter-related policy signals.

New Demands For Teacher Sensemaking

Theoretical Framework

The foregoing practice dilemmas illustrate how mathematics teachers may potentially experience different forms of policy convergence during implementation of CCSSM aligned instruction and new teacher evaluation systems. Dilemmas related to how well professional evaluation models and aligned student assessments measure necessary practice changes may be examples of possible interference or mutual reinforcement, in Knapp et al.'s terms (1998). Conversely, teachers' difficulties in recognizing gaps between their existing practice or beliefs and those demanded by the CCSSM may exemplify mutual reinforcement of new standards and evaluation criteria or cumulation and overload. Irrespective of the particular convergence conditions experienced, practice dilemmas that stem from new, conflicting information or policy directions create uncertainty for some educators. As such, the current implementation environment for mathematics teachers seems ripe for *sensemaking*, or "structur[ing] the unknown" (Waterman, 1990 as cited in Weick, 1995, p.4).

In fact, thousands of scholars across disciplines turn to Weick's (1995) concept of sensemaking in organizations for guidance about what the partially cognitive, partially contextual, and inherently social process entails. Weick relies on theoretical and empirical work of social psychologists and a range of institutional scholars to make his argument that sensemaking is not only interwoven with context but integral to organizing, or arranging work conditions so as to accomplish a collective task. Weick, Sutcliffe, and Obstfeld (2005) summarize the widely applied concept as a partly visible, collective social process whereby a group of people respond to a change in context that disrupts their activity flow by first

challenging, and then restoring, the coherence of how they understand such activity and themselves as actors. This process view highlights how newly constructed meaning can restore order by way of rationalizing resumed activity.

Subsequent educational research often focused on how sensemaking unfolds largely under directly observable conditions, examining sensemaking as a cognitively based social process (Spillane, Reiser, & Reimer, 2002) empirically at the school level (Coburn, 2001) situated within communities of practice (Lave & Wenger, 2002; Wenger, 1998). Other studies recognize the importance of teacher responses (Coburn, 2004), contributions by leaders and non-school actors (Coburn, 2005), the role of sensesgiving (Maitlis, 2005), as well as problem framing (Coburn, 2006). More recently, some educational researchers have viewed sensemaking as source of social or human capital and as a lens to study the span and depth of informal and formal teacher networks (Coburn, Choi, & Mata, 2010; Coburn & Russell, 2008; Kaufman & Stein, 2010; Penuel, Riel, Krause & Frank, 2009; Sun, Penuel, Frank, Gallagher, & Youngs, 2013). This analytical approach places more emphasis on measuring things like how often and to whom teachers turn for practice expertise rather than considering how attention to certain information or cues may contribute to how teachers reconsider their practice.

Accordingly, the lens used to understand sensemaking may place different emphasis on new meaning, order, or resumed activity as products of the process. Previous investigations of teacher sensemaking from a situated perspective have described how inter-relationships among context, teacher interaction, and the policy signal can challenge participants' existing frames of reference for what constitutes good practice and quality teaching. Once more, in the current implementation context, improved practice and teacher quality underlie policymakers' recent

coupling of standards and new teacher evaluation models, fostering my interest in how convergence among standards, aligned student assessments, and teacher evaluation may factor into collective teacher sensemaking about mathematics.

Thus, this study aligns with prior investigations of teacher sensemaking from a situated perspective, investigating how inter-relationships among context, teacher interactions, and policy signals can challenge teachers' practice development (Coburn, 2001; Spillane & Jennings, 1997). It centers on the collective, interactive nature of the process and looks closely at how participants construct new meaning through their noticing of and responses to certain cues, ongoing negotiations, and revision of practice. I consider sensemaking as an organizational property (Weick, 1995) of groups of teachers engaged in collective work tasks that help maintain the organization's activity flow. For schools represent a particular form of organization, and within them, teaching and learning is the activity flow to be maintained. Contrasting studies of groups engaged in sensemaking in knitwear manufacturing (Porac, Thomas & Baden-Fuller, 1989), orchestras (Maitlis, 2005), and pediatric units (Weick, 1995) help demonstrate how external demands for change in the form of new policies, programs, and practice often distinguish schools as organizations.

In more concrete terms, the prevailing hierarchy for educational decision-making generally leaves teachers in the position of being informed of impending policy or program changes and subsequently having to figure out implications for their classroom practice, with varying levels of learning support. That figuring out, or sensemaking, is a dynamic process in which many teachers participate in order to improve their instruction of CCSSM aligned mathematics, now professionally evaluated in fairly specific ways. In fact, employing a situated perspective on collective learning to foster practice growth may shed light on

relationships less apparent in policymakers' variable driven approach to improve mathematics instruction by aligning several policies simultaneously.

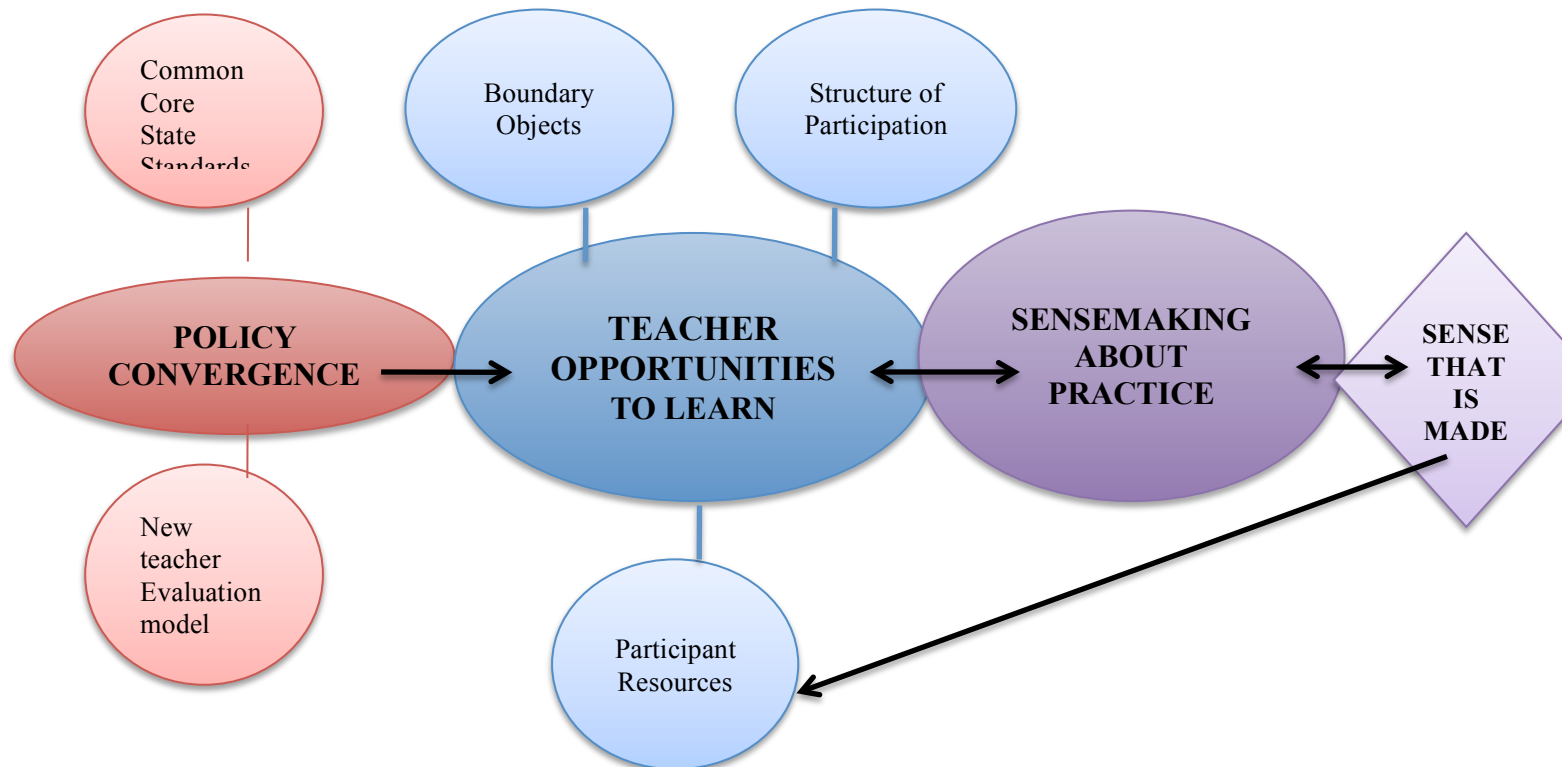
To be clear, policy convergence aims for greater coherence and more uniform mathematics instruction, that student assessments will measure in particular ways, and that factor directly into evaluations of teacher performance and their career outcomes. At the simplest level, individual teacher accountability is expected to drive more consistent mathematics instruction across schools and systems. At the same time, in the course of ordinary work, teachers will continue to plan curriculum together, discuss practice-related issues, and collaborate on instructional goals as these two major policy directions converge. Studying how teachers engage with one another, drawing upon certain policy cues and resources, may point to ways communities of practice structure opportunities to learn as a means of facilitating practice change (Stein & Coburn, 2008). It also represents a different phenomenon of interest than measurement of individual teacher accountability or student learning growth, popularly referenced by policymakers and the public alike.

In particular, this study centers on teachers' collective interactions in select informal *opportunities to learn* arising in the normal course of work (Kaufman & Stein, 2010) to outline what sorts of policy signals, resources, and interpretations teachers seem to find most salient in the newly coupled environment. For the convergence of standards and evaluation policies may shape teachers' sensemaking in tandem, in conflict, or some of both. Taking an in-depth look at how teachers interact with various policy cues and each other *as math educators, learners, and members of school communities* offers a timely glimpse into how some teachers square new information about instruction across multiple roles in a complicated policy environment. As in prior singular policy reforms, teachers must reconcile new CCSSM practice demands and

evaluation measures with established beliefs, previous experience, certain available resources and priorities as well as others' emerging interpretations. Accordingly, this proposal investigates how educators make use of some *boundary objects* (e.g., policy language, curriculum, district priorities, or other resources developed outside of a school community that teachers rely upon for direction) in interactions favoring certain ways of *participation* or engagement (Wenger, 1998), that in turn help shape the sense teachers make about problems of practice.

With this in mind, and after a brief summary of situated learning theory and communities of practice as a related construct, the following sections develop each of the key analytical elements in relationship to one another, as depicted below:

Figure 1. Theoretical Framework



Kaufman & Stein, 2010; Stein & Coburn, 2008

Using situated learning theory to view teacher opportunities to learn

Situated learning theory highlights inter-relationships among participants, the context, and problems of practice (e.g., Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991). In a situated view of learning, participants, their resources including experience, beliefs, and identity, as well as characteristics of the environment such as norms, routines, and rules are inextricably linked to participants' development or learning. Conceptualizing learning as "the historical production, transformation, and change of persons" (Lave & Wenger, 2002, p.51), this theory focuses on the persons involved in an ongoing process rather than as recipients of knowledge as a finite product or achievement. This emphasis supports examination of teachers' experience negotiating new meanings about practice amid multiple signals about policy and what constitutes quality teaching; a process influenced by participants' beliefs and prior experiences and bounded by group discussion parameters like norms, routines and rules, among other elements. Moreover, Lave and Wenger describe the many levels of support a community of practice may experience while engaged in meaning making over time:

a community of practice is a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice. A community of practice is an intrinsic condition for the existence of knowledge, not least because it provides the interpretive support necessary for making sense of its heritage (p. 98).

These researchers expand on how the "set of relations" fosters an "intrinsic condition for the existence of knowledge," emphasizing the inter-relatedness of the persons involved, the depth of their engagement in a collective, social task, and the development of practice and themselves.

They find actively involved members working together can create possibilities for learning that working in isolation does not.

Moreover, these theorists describe the social practice of learning as negotiated, contested, and conflictive because in the resolution of multiple views, participants may work out new ideas about practice (Lave & Wenger, 1991, Wenger, 1998). Equating communities of practice to a necessary condition for interpreting and developing collective knowledge aligns with the view that meaning making and ensuing practice developments is relatively organic, based on the “dilemma-driven nature of learning activity for the people involved” (Wenger, p. 33). In fact, Wenger elaborates on the two important ideas here at length: the organic or emergent nature of negotiated meaning within a community of practice and the close relationship between practice and learning. First Wenger describes practice as unfolding from participants’ engagement in a mutual task involving continuous negotiation, residing “not in books, tools, structures, or other forms”(p. 73), finding that while institutional parameters may influence the development of practice, it is not “reducible to them” (p.119). Then he asserts that “learning is the engine of practice, and practice is the history of that learning” (p. 96).

This emphasis on the active negotiation of new meaning about practice fits well with this study’s consideration of practice dilemmas that may arise when implementation of CCSSM aligned instruction and teacher evaluation systems converge. Negotiation implies the presence of different views that in turn, necessitates some level of sensemaking for resolution. That said, conceptualizing practice as negotiation rather than resident in curricular or evaluation structures likely clashes with policymakers’ desire to link mathematics standards, aligned student assessments, and teacher evaluation criteria to gain better control of what is taught in classrooms. Wenger’s view that negotiation is continuous and that meaning unfolds during participant

engagement suggests a fluid process rather than a fixed outcome. Correspondingly, if practice is not reducible to institutional parameters, then perhaps the notion of controlling practice may be less linear than recent policy couplings might suggest.

Arguably, tensions between control and emergence are longstanding in education but this particular policy configuration may exert new pressure on how communities of practice approach new demands for mathematics instruction and what is learned as a result. At the very least, *how* policy actions that align mathematics standards and teacher evaluation structure may change the future history of teachers' learning seems unclear.

Policy Convergence and Opportunities to Learn

Regarding teachers' experiences in communities of practice and following Wenger (1998), this study centers on what Kaufman and Stein (2010) identify as informal teacher learning opportunities-- professional discussions among educators in the course of daily work such as reviewing curriculum, developing assessments, or evaluating student work. Teacher collaborations of this type have long been thought to de-privatize instruction, positively impact student learning (Supovitz, 2002), and help narrow within school variability.

Structurally speaking, three major elements largely shape teacher opportunities to learn: the participants and the resources each brings; explicit sources of information that direct the participants' collective task; as well as acceptable ways of participant interaction. Recognizing prior investigations of Coburn and Stein (2006), McLaughlin and Talbert (2001), and Stein and D'Amico (2002), Kaufman and Stein's research "demonstrates that professional communities of teachers can provide opportunities for deep, participatory learning" (p. 571). Looking ahead in the argument, sensemaking is one form of deep, participatory learning that may reveal how

teachers develop their practice as they reconcile new understandings about instructional demands resulting from the convergence of CCSSM and teacher evaluation policies. Sensemaking constitutes a desired “action” of teacher opportunities to learn, a precursor to implementing new practice demands. However, discussion now turns to a description of ways in which teachers may approach professional learning opportunities with colleagues as the next step in relating teacher needs for sensemaking as implementation of the CCSSM and new teacher evaluation models converge.

Teachers’ Three Roles as Participants in Opportunities to Learn

As Knapp et al. (1998) note, policy directives generally add to or reorient teachers’ existing responsibilities: in plural, they may be conflictive or coherent, in part or in whole. Whether developed at the national (e.g., content standards), state (e.g., teacher evaluation protocols), district level (e.g., observation rubrics) or some combination (e.g., curricular frameworks), governed change most often originates from actors other than teachers, in language that reflects negotiation and interaction in a different context (Hill, 2006). No matter how clearly stated, content standards, curricular frameworks, evaluation protocols, and observation rubrics offer multiple interpretations according to actors’ experiences and beliefs as educators (Spillane, 1999, Spillane et al., 2002). Again, Leatham’s (2006) conception of the latter as a “sensible system” helps explain how disorder and disjointedness routinely characterize the beginning point of implementation, and sometimes beyond, whether teachers ultimately find multiple policy enactment mutually reinforcing, interfering, or overload.

As a starting point, teachers routinely respond to external directives and softer guidelines for change, and are typically considered implementers of policy (Spillane & Jennings, 1997). As

these researchers point out, this view of teachers' role appears insufficient in general, and in today's new policy context as well. When instructional practice needs revision according to new policies and procedures, organizational conditions for collective sensemaking that help simplify pertinent sources of information must be readily available in schools, a point long noted in organizational (Meyer & Rowan, 1977; Scott, 2008; Weick, 1995) and educational (Cohen & Ball, 1990; Honig & Hatch, 2004; Spillane, 2000) literature. In addition, the lens with which teachers approach the new environment, in part shaped by the convergence of curricular and evaluation policies, is another important factor to consider. Certainly the idea that teachers may consider new information from the vantage point of several roles they play in the school context can complicate examination of their opportunities to learn. Central to this inquiry into how teachers make sense of new Common Core mathematics and modify their practice in light of new effectiveness policy actions are three interpretative roles: as learners, math educators, and members of school communities.

In the case of the CCSSM, teachers implement new standards and aligned assessments with their students as math educators. However, in order to accomplish desired instructional goals, teachers often rely on varying supports as learners and members of school communities to effect practice change. Thus, before implementing required changes, teachers must first learn about what the curricular and evaluation policies entail in order to envision how they might affect their practice of mathematics. Consistent with this study's focus on teacher learning opportunities and situated perspective, it is important to explore both the role of learner and community member in more detail.

Borrowing from Bloom's taxonomy, teacher learning can occur at variety of cognitive levels: knowing the language of policies, understanding intended changes, applying new

information, analyzing a range of practice options, synthesizing conflicting expectations and past professional experience, creating new practice elements and/or evaluating their effectiveness. Then, as they implement actual instructional change with students, teachers also have opportunities to learn about policies in response to what unfolds in their classrooms (Sherin, 2002). Spanning both formal and informal learning opportunities, multiple sources of incomplete information likely influence teacher interpretation of policies. For example, teachers may interact with policy signals, district interpretations, principals' suggestions, and one another during time carved out of or within the school day. These interactions may be mandated, encouraged, or happenstance, and mediated by factors such as school leadership, status of the school, depth of professional community, capacity in the forms of accessible expertise and resources, as well as teachers' own efficacy, as noted below.

At the same time, communities of practice can provide critical support for practice development and learning. Group reconciliation of new, unfamiliar information or direction takes time and patience, requiring negotiations of meaning and action before participants' existing frames of references or interpretative lens, may be modified. Without such negotiation, it remains too easy to regard the new as the familiar, as "learning occurs when categorization fails, that is, when experience becomes puzzling" (Spillane, 2000, p. 170). Practically speaking, unless educators recognize new information about practice as disconfirming, then their existing categorization will hold, as finding a way to fit new information into existing frames of reference is far easier than any social reconciliation process. The classic case of Mrs. Oublier (Cohen, 1990) demonstrates how individuals more easily apply new information to the wrong frame of reference. Within her classroom, this teacher works diligently to change her teaching in line with the first wave of curricular standards, yet fails to grasp key conceptual changes and makes only

surface level changes. This case is so instructive as this level of instructional improvement is too often typical. In fact, the ability to notice not just surface similarities but key structural differences in an ambiguous policy or unclear curriculum framework is often associated with how experts learn (Bransford et al., 2000). Conversely, all teachers may be novice learners of some aspects of CCSSM implementation, given content changes across many grade levels as well as calls for greater reliance on eight specified practices. In this role, even with solid learning supports and educator motivation, discussing unfamiliar concepts with colleagues may lead to validation of existing practice rather than interrogation or negotiation of new meaning (Penuel et al., 2009). However, teachers' propensity to embrace the role of learner and their membership in a supportive community of math educators seems instrumental to deeper "participatory learning" (Lave & Wenger, 1991, p. 95), of which sensemaking is an example, and ultimately to practice change. At the very least, regarding teachers as implementers gives short shrift to the multiple ways they may interpret policy signals and implications for practice.

Having recognized teachers' multiple roles within mathematics oriented communities of practice, I will now describe more specifically how policy convergence may challenge more than participant resources and perspectives, by privileging certain information and ways of participating in teacher learning opportunities about curricular reforms amid new evaluation protocols.

How Policy Convergence May Shape New Information About Practice

New information that challenges teachers' existing frames of reference about practice may take various forms, originating from both within and outside the school district. In the current reform context, policy language, the CCSSM, mathematics curricula, newly aligned

student assessments, district evaluation rubrics, district priorities, administrator direction, and professional development materials may function as cues for change, about what should be taught, valued, or evaluated in mathematics instruction. These sources of information may serve as boundary objects, or means of directing a community of practice's negotiations of new meaning (Wenger, 1998). Designed in one community and then used by another to focus understanding and practice, boundary objects often take the form of artifacts, tools, and concepts. They are reifications, examples of "a certain understanding [that] is given form" or how an idea becomes a "thing" (Wenger, p. 59). Wenger, among others, notes that reifications focus meaning and practice as people often look to laws, procedures, or other codified ways of being or doing for direction and as factual evidence of knowledge. Yet, this researcher also recognizes from a more organizational perspective, that "when a boundary object serves multiple constituencies, each has only partial control over the interpretation of the object" (p. 108). This notion of partial control seems another way of describing the organic nature of interpretation across communities of practice (Lave & Wenger, 1991) mentioned earlier.

Furthermore, since boundary objects originate in one community of practice and "travel" to another, once taken up and interpreted by others, they may acquire different meanings, of diminished or heightened importance. Again, no matter how well aligned or coordinated boundary objects may be, different groups may interpret their meaning and intent differently. This may add tension to a community's reconciliation of new practice demands. For example, drafted by national assessment experts, educational policy advocates, and state government officials, the CCSSM moved through state boards of education and districts to reach teachers at the school level who work to understand and implement them. At the same time, materials or information that reflect interpretations of other curriculum developers and professional

development professionals also reach into schools, as does policy language adopted by the state for evaluation and district developed performance metrics. Thus, teachers come into contact with many sources of information, created by various bodies with their own interpretations, highlighting select aspects of the newly coupled policy environment. Working as a collective, teachers must then weigh multiple sources of information and various interpretations against their own experience and beliefs.

Recalling Wenger, Stein and Coburn (2008) further assert that “reifications, alone, while efficient for reaching large numbers of people, have limited ability in coordinating meanings because there is not enough overlapping experience between the communities that created the reification and the community that encountered it ...” with teachers’ responses likely “literal and procedural,” fostering compliance only (p. 590). Even in a best case of policy convergence, when boundary objects like the CCSSM and new evaluation protocols appear mutually reinforcing, coordinated meaning from policymakers to teachers should not be assumed. Moreover, teachers’ reliance on boundary objects to improve practice, albeit efficient, can compromise outcomes, as past reform efforts have shown that compliance is insufficient to motivate meaningful practice change. In light of the current implementation context, these findings raise a set of practice related questions: what meanings do teachers generate in reconciling their interpretations of reified content and practices in the form of the CCSSM, reified student knowledge as measured by newly aligned assessments, and reified professional performance as indicated by new evaluation models? And if relying on reified knowledge via boundary objects is insufficient for deeper learning, what other resources must be available in teachers’ communities of practice to move beyond compliance towards meaningful practice change?

How the Structure of Participation May Contribute to Opportunities to Learn

Boundary objects represent one type of information about policy changes that teachers may encounter. In addition, participation or interaction patterns remain critical to learning and sensemaking (Hill, 2001; McLaughlin & Talbert, 2001; Spillane, 1999). More specifically, educational researchers have long noted how routines as organizational structures can support teachers' professional conversations (Coburn, 2001; Feldman & Pentland, 2003; Spillane & Jennings, 1997; Stein & Coburn, 2008) and help shape teachers' opportunities to learn (Kaufman & Stein, 2010; Spillane, Parise, & Sherer, 2011). Feldman and Pentland's definition that a routine is recognizable, repeated over time, and involves at least two participants is a solid first step in sketching how teachers may engage together about problems of practice. Routines provide some information about the ways in which participation can occur in community. Spillane et al. (2011) see routines as increasing efficiency, coordinating action, and encoding organizational knowledge used regularly. These researchers remind that these functions may contribute positively, if they reduce conflict about how to accomplish the task, or negatively, should de-skilling occur in the course of reduction. Additionally, Stein and Coburn's analysis of how the level and extent of teachers' participation shapes their opportunities to learn helps connect routines and participation to collective learning about practice. Like these researchers, I find it important to unpack the how the structure of participation may contribute to sensemaking, separately and then, in interaction with boundary objects as discussed above.

Routines help structure participation in a community through repetition, which can help build expectancy and familiarity over time (Weick, 1995). Another variable that can either reinforce the status quo or trigger change (Spillane et al, 2011) is the composition of participants. For example, a person's position as well as the knowledge and beliefs brought forward helps

shape participation in several ways. Levels of authority, both perceived and positional, can direct people's attention to leaders' contributions (Coburn, 2005) and less so to others' contributions. Leaders commonly frame the problem or opportunity for consideration (Coburn, 2006) that also helps focus attention on select facets or interpretations. Leaders may also introduce or rely on certain boundary items and not others, which again figure into what the group focuses its attention. In addition to boundary items, membership, and related authorities, resources such as allowable time and frequency also contribute to how participation unfolds (Stein & Coburn, 2008). Time can either compress or expand discussion, allow for opening up negotiations or narrowing the focus while frequency can aid participant familiarity and help reinforce emerging group norms, or not. In sum, all of these elements may play a part in what information and how a community of practice notices, negotiates, and moves toward new meaning.

In addition, participation or forms of interaction, help connects members and boundary objects in either productive or less productive ways. Members' interpretations of information like the CCSSM, revised curriculum, or district priorities may rely not only on their own knowledge or experience, but often on that of others accessed through interaction. Whether strong or weak, this connection among persons involved, new information, and participation is integral to the process of sensemaking and further development of practice.

Sensemaking as a Multi-Directional Cognitive Process

Weick's (1995) original view of sensemaking as an organizational property highlights how new, socially constructed meaning can restore order when participants actively negotiate varying interpretations about "what just happened" and ultimately rationalize a new orientation toward resumed activity. However useful a definition, sensemaking is not as straightforward or

linear as most often described. Sensemaking remains only partly visible, even when observed in social interaction, and less than perfectly understood as a process because of how cognitive structuring works. People's prior knowledge, experience, and beliefs shape ongoing categorization of new information into previously developed forms that each person develops uniquely according to his or her lived experience (Bransford, et al., 2000). With every individual employing their own categorization system to absorb new information, sensemaking is no easy feat, even under the "right" conditions. It involves participants' reconciliation of divergent perspectives, oftentimes in a confusing situation bounded by some amount of organizational history that fosters customary ways of engagement around work tasks already understood in a certain way. Given that teachers' opportunities to learn functions as this proposal's phenomenon of interest, and is viewed through a situated lens, the following discussion focuses on sensemaking that occurs at a collective level.

Weick (1995) addresses both the organizational and cognitive properties of sensemaking. To begin, Weick's elaboration of the seven properties of sensemaking that distinguish it from "other explanatory processes" (p.17) serves as a framework for sensemaking in organizations. In his estimation, sensemaking generally revolves around an event of consequence that injects incongruity about something people think or expect, causing them to respond to certain cues, in part because of with whom they associate and their collective beliefs, that ultimately enables the resumption of critical activity. This researcher notes that when participants experience a "shock", or interruption of consequence to their identity and core activity that is both difficult to overlook and remedy, these elements increase the need for sensemaking. Summarizing sensemaking's multiple entry points, Weick notes it may begin either with beliefs, with the process taking the

form of arguing and making expectations clear or starting with actions that then require participants' justifications and commitments:

Sensemaking is an effort to tie beliefs and actions more closely together as when arguments lead to consensus on action, clarified expectations pave the way for confirming actions, committed actions uncover acceptable justifications for their occurrence, or bold actions simplify the world and make it clearer what is going on and what it means. (p. 135)

In this organizational view then, evidence of argument, resolution, clarifications, confirming actions, and articulated justifications represent one form of sensemaking while bold action that simplifies the need for meaning making represents another.

As a cognitive process, sensemaking often follows a noticeable cue for change or some piece of information that seems out of alignment with the prevailing view of “how things work.” In terms of sequence, group members must first stop what they are doing long enough to notice that something noteworthy and ambiguous or surprising has occurred. This disruption may cause them to question whether this event or policy direction “the same or different” than what has been transpiring (Weick et al., 2005). Whether a form of this question gets voiced (and therefore made visible) may depend on the norms, rules, and routines of the social space they inhabit (Magala, 1997, among others). In other words, organizations provide certain social cues for interaction that signal importance or how a topic may be considered, with involved persons reacting and responding to these organizational cues, language, and each other during sensemaking (Weber & Glynn, 2006).

Juxtaposing Wenger's terminology with this organizational view, sometimes when teachers' own resources and ways of participating interact with reifications that challenge the

status quo, new meaning is generated. Other times, the reification itself, established structure of participation, or members' lack of resources can hinder collective understanding, negotiation of meaning, and practice growth. Correspondingly, there may be instances of stronger or weaker sensemaking among working groups, or at the very least, clearer or more vague evidence that teacher sensemaking seems to occur. In this regard, Weick's description above provides a good framework for what to look for when observing teachers' current opportunities to learn and suggests two different ways communities of practice may approach sensemaking about their mathematics practice. Policymakers may intend for the new standards to serve as bold action that simplifies instructional choices, but teacher groups may subscribe to another theory of action, implementing the CCSSM and coming together to learn from what transpires in their classrooms, or use their collective time to weigh their differing beliefs and interpretations of the new standards, and then acting.

The coupling of new instructional direction with more prescribed and precise measurement of teachers' instructional quality via new evaluation protocols certainly heightens the consequences of teacher responses to new information concerning practice. The stakes are only getting higher. Moreover, policymakers' decisions to align the new standards, student learning assessments, and teacher evaluations may take direct aim at teachers' instructional choices, but they may also increase uncertainty about teachers' professional identities, whether expressed in measurements of their teaching proficiency or by increasing their need for specific learning opportunities. Therefore, enactment of new standards that demand certain approaches to instruction or different coverage of content may challenge existing beliefs about themselves as professional educators, as members of a school team working to improve student instruction, or as learners committed to developing their practice.

Weick's explanation of how various sub-processes contribute to ongoing sensemaking, like problem framing, noticing, interpreting, clarifying, and developing new explanations, points to different "actions" that may transpire in teachers' current opportunities to learn. In terms of these sub-processes, for now it is important to note these cognitive activities emphasize related but different participant skills. Moreover, in the course of sensemaking, participants must move beyond noticing to other higher order thinking skills as a part of deciding what to do with challenging or disconfirming information. Weick elaborates further, "sensemaking is about authoring as well as interpretation, creation, as well as discovery" (1995, p.8). This statement helps relate the new and unfamiliar (interpretation) to established frames of reference or the stimulation of new solutions (authoring, creation, discovery). As a set of sensemaking actions, authoring, creating, and discovering require some level of professional autonomy for participants to work through disconfirming information and succeed in creating or authoring new explanations.

Again, applying a sensemaking frame to teachers' informal learning about a series of aligned policy events may highlight certain tensions in the current implementation context. Given policymakers' desire to control instruction, how does the tighter coupling of standards, aligned student assessments, and teacher evaluation models affect teachers' own learning environment, specifically the opportunities to author, create, or discover critical aspects of mathematics practice? This question seems critical to understanding the scope of teacher sensemaking during this particular policy convergence and perhaps, as a potential influence on student learning. For example, and as previously mentioned, over-reliance on reifications in sensemaking often results in more procedural rather than deeper learning (Stein & Coburn, 2008; Wenger, 1998) and deskilling can result from routines that overly reduce conflicts related to task

completion (Spillane et al., 2011). Said differently, the coupling of new mathematics standards and teacher accountability may alter how problems of instruction are framed, what sensemaking resources get introduced, as well as the range of plausible solutions for consideration.

Therefore, in observed opportunities to learn about CCSSM aligned mathematics, it seems important to look for ways in which this policy coupling may contribute to how teachers engage in a broad continuum of sensemaking activities. For some researchers like Weber and Glynn (2006), see that changes in context can both precede and emerge from the process of sensemaking. In this regard, as implementation of the CCSSM and teacher evaluation systems converge, new policy directions and tighter coupling may both influence the initial structure of teachers' participation, or the rules of engagement, as well as emerge from the meaning making that helps facilitate resumed activity with a different orientation toward practice.

Although commonly viewed as setting the change cycle in motion, policy actions may mean little to teachers until they reconcile associated practice implications. To be sure, teachers' understanding of policy actions such as the CCSSM and new teacher evaluation systems may emerge in several different ways, from collective sensemaking activity to observations of other classrooms, through trial and error, or in the process of being professionally evaluated. On a practical level, the CCSSM and new state statutes governing teacher evaluation systems now influence the development of curricular materials, student assessments, professional learning activity, and classroom observation protocols that directly figure into teachers' daily practice decisions. From this perspective, these elements may serve as sensemaking resources and their alignment may focus attention on certain aspects of instruction, at the exclusion of others.

The Role of Sensegiving in Sensemaking

Another way teachers often become aware of practice implications of policy change is via administrative direction or “sensegiving.” Credited with originating the term, Gioia and Chittipedi (1991) define sensegiving as the “process of attempting to influence the sensemaking and meaning construction of others toward a preferred redefinition of organizational reality” (p. 442). Commonly viewed as a top-down, sensegiving in school organizational studies has centered on the district leader role (most notably Coburn, 2005; Coburn & Russell, 2009; Cosner, 2011; and Stein, Hubbard & Mehan, 2004). Yet, Maitlis (2005) describes the interplay between leader and stakeholder sensegiving as reciprocal responses related to the interpretation and explanation of ongoing cues (sensemaking). In particular, this research on orchestras notes that the strength of leader sensegiving on the sensemaking process varies according to the locus and nature of expertise, legitimacy, and passion for the issue at hand. With this in mind, Maitlis finds leader sensegiving may exert a great deal of influence or function as one of many sensemaking inputs or “guided actions” to participant groups.

Mapping these original findings across organizations (Maitlis & Christenson, 2014) onto this study’s theoretical model, leaders can help structure participation in teachers’ opportunities to learn by how they set agendas, privilege certain routines, and/or provide or withhold resources such as time. In addition, leaders may transmit sensegiving through the selection of certain boundary items to focus discussion. Maitlis and Lawrence (2007) consider time and space of organizational structures critical for participants’ engagement in sensegiving, a seeming parallel observation to how Weick and others understand some enablers of sensemaking. What’s more, Maitlis and Christianson (2014) take up how sensemaking and sensegiving may be intertwined in service of “planned change interventions,” which seems highly applicable to CCSSM

implementation. These researchers note that “planned change interventions” can 1) take direct aim at modifying organizational meanings that in turn trigger sensemaking about practice as a response, 2) may first initiate structural change which creates ambiguity about organizational meanings and then sensemaking ensues, or 3) link changes to organizational structure and meanings with sensemaking “...triggered both by managerial sensegiving and by changes in employees’ daily practices and interactions” (p. 76).

Thinking about CCSSM implementation at the intersection of standards and accountability policy as “a planned change intervention,” policymakers initiated change in both meanings (quality mathematics instruction and definition of teacher quality) and structures (more uniform teacher evaluation and prescribed role of student assessment). For teachers, sensegiving seemingly comes from many directions – policy advocates, state evaluation and curriculum models, district leaders, assessment developers, and textbook publishers all try to influence elements of the sensemaking process and ultimately, the sense that is made about practice. Amid these cues, teachers continue to make sense of the new structures, practice demands, and implications for both their career progressions and what it means to be a teacher of Common Core aligned mathematics. They may share their emerging insights with colleagues in informal opportunities to learn or other social opportunities. At the very least, as educators they act as sensegivers about the CCSSM in their own classrooms. That said, teachers’ experiences implementing new instructional practice with students in their classrooms can generate additional cues for sensemaking, which may or may not align with the original outline of sensegiving, whether put forth by leader or other stakeholders.

Thus, for the purposes of this study, sensegiving and sensemaking are best understood in relationship rather than in isolation. As noted above, actual leader as well as participant

sensegiving may figure prominently within the structure of participation, in conjunction with boundary items and/or participant resources (e.g., position, expertise, subject knowledge, or prior experience). Yet, considering the body of literature underpinning the theoretical framework as a whole, I primarily examine observed interactions for evidence of teacher sensemaking and note where sensegiving may figure more prominently in that process. Lastly, Maitlis and Christianson (2014) more recently find studies that examine exactly who contributes to meaning making and how they seem to do so are rare. This observation and my study's examination of teachers' informal professional learning opportunities, suggests the need for research into how individual members of grade level teams may contribute to the form sensemaking takes as well as to the nature of the sense that is made in community.

The Sense that is Made About New Demands for Practice Change

To recap, resources that range from the physical like revised curriculum to the more conceptual such as administrator support can function as cues for practice change, but even if noticed, do not guarantee it. When several different policy actions simultaneously demand teachers' attention, they may incite a variety of responses depending on how teachers understand the imperatives (as mandate, direction, or consideration) and /or experience their convergence (such as mutually reinforcing, conflicting, or overload). In addition, the structuring of the task at hand, the nature of the questions asked (or answered), the use or absence of critical resources as well as participant roles or expertise may contribute to meaning making and/or confusion. In short, the potential bi-directionality of the CCSSM and new evaluation systems as both an impetus for and outcome of sensemaking about practice seems noteworthy in a tighter policy environment. Distinguishing forms of participation that enable members to take up certain aspects of available information is complicated by the fact that sensemaking and attendant sub-

processes of noticing, questioning, and negotiation, remain only partially visible. This means it may not be possible to isolate the effects of participants' knowledge and experience, attention to certain information sources, and ways of interaction to pinpoint explicit enablers or breakdowns in sensemaking. However, a means of gauging participants' emerging interpretations of new information is to examine the sense teachers make about practice, the final concept in this theoretical framework.

One way to understand what messages about policy teachers find most salient as they collaboratively plan lessons, review curriculum or student assessments, or undertake other instructional tasks, is to work backwards from the new sense they seem to make. Of course, given observations of interactions over time, teachers likely give a range of responses, even to a narrow list of topics related to practice, because interactions take place in relation to what has just transpired, the participants present, how the question was asked, the availability of key resources such as key boundary objects for reference, knowledge or experience, and even time. In addition, Coburn (2004) notes that the degree of institutional pressures like the intensity, pervasiveness, and voluntariness or the new information may affect teachers' responses as may the level of congruence with existing practice or beliefs (p. 221). In particular, this researcher noted that when teachers experience more intense messages that are frequent and insistent but voluntary, they find them most involving. Again, since the current policy environment explicitly seeks to control mathematics instruction by tightening and making the relationship among standards, student testing, and teacher evaluation much less voluntary, considering institutional pressures on teachers is quite germane to this research.

At the same time, looking at how teachers experience the convergence of instructional and accountability policies by examining their responses that emerge from the sensemaking process

about new practice demands seems appropriate in the early implementation stage.

Correspondingly, this study's focus on teachers' opportunities to learn about CCSSM aligned mathematics necessitates analysis of their interactions, including questions raised and boundary items referenced, as well as spoken responses that relate to practice. The intent remains to describe teachers' collective sensemaking about mathematics in the newly coupled policy environment fraught with simultaneous uncertainties about practice expectations, scope of student assessments, and measurement of teaching proficiency. Said another way, looking for instances of sensemaking in informal teacher opportunities to learn necessitates understanding how broad system changes such as policy signals interact with identified components that comprise teacher opportunities to learn, and thereby shape how and what sense teachers actually make about CCSSM practice demands.

Conclusion

In conclusion, this theoretical framework employs a situated learning lens with which to examine teachers' informal opportunities to learn for instances of sensemaking in the doing of collaborative work such as curriculum review, lesson planning, or assessment development in service of CCSSM aligned instruction. As outlined by Wenger and others, interactions among the roles and perspectives of members, reliance on boundary objects to transmit new information, and forms of participation that develop, critically shape reconciliation of dilemmas related to practice and new negotiated meaning. Based on prior research, teacher responses to information about new practice demands may vary according to the manner in which the information is shared, teachers' level of involvement with such information, and the degree to which compliance is mandatory or not. Institutional pressures that accompany new information about practice not only may shape the contours of the sensemaking process by influencing the

nature and role of boundary items, but may also factor into the group's ongoing forms of participation. Observed interplay between sensegiving, whether by leader or other participants, and sensemaking may be important to ultimate descriptions of the educators' process and nature of the sense that is made, as an outcome. As a result, analysis of how teachers work to develop their mathematics practice to conform with aligned standards and evaluation policies seems far less linear or automatic than recent expectations for coupling might suggest.

Research Design And Methods

Design Overview

This qualitative study examined one team of sixth grade teachers' informal opportunities to learn about CCSSM aligned mathematics in a policy environment characterized by newly coupled student assessments and teacher evaluation criteria. The design followed Heck et al.'s (2011) research agenda that "the CCSSM can be viewed as a set of hypotheses—if the system responds to the standards and mathematics education is provided as the standards expect, then improved student outcomes will result" (p.24). Notably, this study centered on a tiny slice of this idea: that teachers would experience new convergence between standards and accountability policies in ways that shaped their sensemaking about practice demands for aligned mathematics teaching. Descriptive and exploratory research questions, which Yin (1998) suggested are appropriate for qualitative case study research, focused examination on process:

1. Within informal opportunities to learn about aligning instruction to the CCSSM, how does the convergence of new standards, assessment, and evaluation policy influence how teachers make sense of new practice demands as well as the sense that they make?
2. How do teachers' experiences as learners, professionals, and members of a broader school community influence the sensemaking process and the sense that they make about practice related to new standards, assessment, and evaluation policy?

With these overarching questions in mind, the following propositions underlay this study:

1. Policymakers foresaw that CCSSM aligned instruction would improve student learning, as measured by PARCC student assessments that would factor into teacher evaluation outcomes. Said another way, they mandated coupled policies to control instruction

and anticipated that teachers would experience mutual reinforcing (Knapp, et al., 1998) policy convergence conditions. Under this scenario, observed sensemaking would center on practice changes related to teaching the new standards in ways that new student assessments would measure.

2. At the same time, actual implementation of coupled policies might differ from policymakers' ideals such that teachers could easily experience either interference or cumulation and overload conditions (Knapp et al.) and disregard some key messages. In observed sensemaking, therefore, teachers might surface other conflicts about practice, exhibit behavior associated with compliance (e.g., focus on procedures rather than more complex practice change), or reject certain aspects of policy related practice demands. In other words, sensemaking about practice could easily deviate from how to teach the new standards in ways that aligned student assessments would measure.

Borrowing from Ragin's (1999) four-box model about establishing necessary versus sufficient causation conditions in cases, the first proposition contained both the cause (coupled policies) and desired outcome (more uniform convergence experience helps focus practice change to support CCSSM instruction as measured by aligned student assessments). This proposition captured policymakers' expectation that the act of linking instructional and accountability policies would focus educator sensemaking about instruction (and ultimately enactment) in a certain way. Alternatively, the second proposition contained the same cause but assumed different outcomes than policymakers' desired end state. Simply put, it included the possibility that educators might experience policy convergence differently and embrace either less robust or selective practice change. Therefore, case instances that aligned with the first

proposition would support policymakers' established logic that coupling would necessitate emphasis on envisioned instructional change while the second proposition helped assess the sufficiency of coupling policies to ensure CCSSM aligned instruction as measured by student assessments. Taken together, these propositions probed whether mandating coupled policies resulted in one or more types of policy convergence for teachers that influenced sensemaking about new instructional demands.

In order to investigate these propositions empirically, I observed interactions among a well-established middle school grade level team and interviewed individual teachers as well as the school principal and math facilitator who participated in observed group sessions. In addition, I collected documents/resources related to these interactions to supplement primary data sources. To interpret findings, I relied on the foregoing theoretical framework as well as recognized qualitative methods (e.g., Miles & Huberman, 1994; Yin, 2009) and communications research related to conversational analysis (Bloome et al, 2008; Gee, 2004; Psathas, 1994; Sacks et al., 1974, Schiffrin, 1994). Finally, collective teacher sensemaking about practice in informal opportunities to learn constituted this study's phenomenon of interest, and based on my theoretical framework, the working educator group (primary) and individual participants (secondary) served as the units of analysis.

Research context. Case selection was purposeful. I intentionally chose a team of mathematics educators within Fairfield Oaks, a suburban elementary district outside a major Midwestern city with high student socio-economic status, strong test scores, and considered to be a top site for employment (e.g., small class size, generous pay scale, and commitment to teacher development). The following rationale guided this choice. Historically, strong student test scores have correlated with high socio-economic status (Brooks-Gunn & Duncan, 1997; Coleman et al,

1966; Sirin, 2005) so the imposition of new student assessments like the PARCC should not likely topple this relationship in the very near future. Furthermore, higher scoring suburban districts that limit class size, pay teachers at above average rates of pay, and appear to invest in teacher development incentivize higher than average interest in employment (Boyd, Lankford, Loeb, & Wyckoff, 2006; Hanushek, Kain & Rivkin, 2001), with many teachers sorting themselves toward higher performing schools if they can (Lankford, Loeb & Wyckoff, 2002). Since Bidwell and Kasarda (1975), researchers across disciplines have studied relationships among district conditions, student achievement, and other outcomes. Recently Bryk, Sebring, Allensworth, Luppescu, and Easton (2010) found that Chicago public schools with strong student scores generally experienced higher levels of local community support and lower levels of more centralized management. As such, the above selection characteristics aimed to locate a district with a history of strong student achievement and high support of teacher learning, far removed from the weight of negative state sanctions related to student performance. On paper, this type of district (and its teachers) should have had the least to fear from accountability driven policymakers during the nearly simultaneous implementation of new standards, student assessments, and teacher evaluation protocols.

At the outset of the study, I recognized that these district characteristics could diminish the power of some incentives built into state accountability policies, like those that can threaten school funding, span of control, and now, individual teacher career progressions, based on student performance measures. Said differently, I sought a case that might test the strength of policymakers' variable based model. However, Bulkley, Fairman, and Martinez's (2004) analysis of districts' varying responses to curricular and testing reforms reminded how accountability can work differently in these types of districts, creating more political rather than

educational pressure for change. These researchers found that administrators in some districts with such characteristics felt more urgency to respond to parental comparisons of nearby districts' test scores than to change their orientation towards mathematics instruction in line with new state standards. Moreover, Bulkley et al.'s comparative case study of six New Jersey districts that varied according to size and wealth, but were strongly committed to teacher development, found that financial resources alone did not account for how districts responded to reform directives. One suburban district focused on "decontextualized and content-based strategies for improving test scores, rather than on developing teacher and student learning through a broad rethinking of mathematical goals and approaches" (p.120) while another drew heavily on financial and knowledge resources within the district and outside coaching for more comprehensive curricular reforms.

This research suggested that a case chosen for students with high SES and high employment demand among teachers could reveal some differences in local implementation. In fact, Bulkley et al.'s study findings would suggest caution in assuming that Fairfield Oaks' responses to implementation of the CCSSM, new student assessments, and teacher evaluation models would proceed according to policymakers' expectations. Further, this line of reasoning seemed consistent with the second proposition above, which highlighted uncertainties in how teacher groups might react to learning about new demands for mathematics instruction vs. policymakers' logic of linking standards, student assessment, and teacher evaluation.

At the same time, strong and coherent learning supports in the form of well-established collaboration, daily planning time, skilled facilitation, and abundant knowledge resources made this single case study revelatory (Yin, 1998). At the time of observations, studied teachers taught two sections each of both mathematics and science, served as advisors to about twenty students,

and were paired with a language arts/social studies teaching partner. In addition to the four academic sections taught, teachers shared two periods of daily common planning time with their math/science colleagues and two others with their respective teaching partners.

With daily common planning time and weekly team meetings in place for at least seven years (C. James, field notes, May 21, 2014; E. Hooper, interview, April 9, 2015), these educators had begun working collectively on their math practice prior to incorporating the CCSSM or administering the PARCC to students. In a pre-selection interview, the Fairfield Oaks' Curriculum Director spoke to how this team developed, noting their weekly meetings helped create shared purpose, that "...shifts the focus to practice and to students rather than the 'me' of teachers.... Work is now ours and that shifts the conversation, but it was a hard shift and a long process to get everyone working on the same things and tough on leadership" (C. James, field notes, May 21, 2014). Thus, regular time to collaborate plus well-established routines and communication norms among team members were several ways observed opportunities to learn seemed an exemplar support in the current accountability environment.

Focal Participants. The focus of this study was a sixth grade team of five teachers, one math facilitator, and the Clark Middle School principal as they engaged in informal learning opportunities (Kaufman & Stein, 2010) about mathematics. Over the six-month observation period, other educators occasionally participated in observations from within (the Curriculum and Special Education departments) and outside the district (curriculum consultant). Throughout the data, fictitious names were assigned to all participants to conceal their identities and that of their school, district, or professional affiliation to impede any tracing back of responses or described working group conditions. However, researcher attention centered on interactions among focal participants in professional discussion in the course of daily work like planning or

reviewing curriculum, developing or reviewing student assessments, or evaluating student work.

The following table summarizes key information about focal participants (focus group,

December 18, 2014):

Table I *Educator Background Information*

	<u>Position</u>	<u>Gender</u>	<u>Education</u>	<u>Years Teaching</u>	<u>Years in District</u>
Barbara	Teacher	F	M.Ed w/ mid schl endorsement	18	14
Erin	Facilitator	F	M.Ed w/mid schl endorsement	31	23
Jack	Teacher	M	M.Ed	6	9
Kara	Teacher	F	M.Ed w/ mid schl endorsement	3	3
Kathy	Principal	F	M.Ed Administration	9	2
Melissa	Teacher	F	M.Ed Curriculum, Admin.	7	5
Phil	Teacher	M	M.Ed	18	18

Teachers had a range of experience within and outside the team and district. On one hand, Kara was in her first teaching position of her career and both Jack and Phil had also only taught at the Clark Middle School. On the other hand, Barbara, Melissa, and Kathy had previous teaching experience outside the district and Erin had developed an extensive professional network among mathematics educators and researchers. Over the period, Erin served as a dedicated mathematics facilitator and coaching resource for the sixth grade as well as led district-wide curriculum

efforts related to mathematics. Kathy had recently been promoted to principal of the Clark Middle School (grades five and six).

Procedures

Before observations got underway, I used a pre-selection interview (Appendix A) to ensure selected site characteristics aligned with high employment demand districts with high SES/student test scores; regular meetings of mathematics faculty around CCSSM implementation; and dedicated middle school mathematics teachers. Having established my interest in observing sixth, seventh or eighth grade educators who faced integrating and winnowing large amounts of shifted CCSSM content, I spoke with both the Fairfield Oaks' Superintendent and the Director of Curriculum to gather information about the district's approach to adopting the new policies, their impressions about the middle grade teams, and respective work plans implementing Common Core mathematics. After obtaining access to the district in November 2014, I then recruited members of the sixth grade team to participate in this case study on the basis of their well-established pattern of collaborative practice with one another.

Observations of the sixth grade team took place during regularly scheduled team meetings at Clark Middle School from December 2014 through June 2015 and were audiotaped, transcribed, with supplemented with field notes. As expected, examination of "the talk involved" in discussions about mathematics revealed participants' interaction with content, practice, each other, and other context factors. To round out analysis, I also collected select documents referenced by participants that related to the standards, aligned instruction, the PARCC assessment, or measurement of student/professional performance.

In addition, I initially interviewed focal participants as a group about their experiences in ongoing informal learning opportunities as observations got underway. I also interviewed them again individually during the second half of the observation period to confirm emerging understandings about their conceptions of the policy shifts underway. I conducted both sets of interviews at the school site, audiotaped, and then transcribed them verbatim. According to approved protocols, second round questions explored key items outlined in the study's conceptual framework such as sensemaking, salient boundary objects, and practice dilemmas experienced in their roles as math educators. As part of developing the second interview protocol, I piloted interview questions with an uninvolved teacher for clarity and revision prior to finalization.

Developing a Research Relationship

In this study, I functioned as a non-participant observer during the data collection process (Emerson, Fretz, and Shaw, 1995). My previous service as a school board member for the Fairfield Oaks district (ending in 2011), as well as participation in various activities alongside some teachers and administrators in that role, facilitated access and enhanced background knowledge of the district at the outset of the study. Before the study began, I had had previous contact with two non-focal participants (Superintendent and Curriculum Director) and the sixth grade math facilitator. Over the observation period, Erin the facilitator served as my primary contact, alerting me to upcoming meetings, and including me on the distribution of team meeting agendas or meeting summaries. However, the frequency of observations plus interactions with individual participants in both group settings and individual interviews changed my relative position as a researcher vis a vis focal participants as deeper relations with some members developed over time. Ongoing conversations with members of my dissertation committee

regarding findings, as well as specific verification procedures outlined below, helped counterbalance the bias that could have developed as a result of my prior relationship with some District administrators.

Data Collection

Following IRB and district approvals in Fall 2014, data collection took place during the remainder of the 2014-2015 school year. The study included ten observed sessions of approximately 30 minutes to a few hours each, for just over 13 total observational hours to witness the development of group discussion norms, opportunities for teachers to share individual practice experience or policy knowledge, and teacher responses to different learning tasks. Observations took place one to three times per month over the period. Although many of the observations occurred during the team's weekly meetings, I also followed up with educators when they expressed a need to get together at other times to delve into a topic further. In this way, observed meetings ranged from weekly facilitator-led sessions about multiple topics to a couple of teachers interrogating curriculum pilot work to multi-hour discussions with the principal involved. This range of meeting duration, type, and participants ensured observation of teachers in different roles (e.g., learner and leader) as well as revealed the great variety of topics routinely discussed by this group during their common planning time.

Another source of primary data, interviews of focal participants, totaled about seven and a half hours, and probed educators' impressions about implementation of each policy as well as their individual convergence experiences. In addition, I collected copies of curricula materials, rubrics, team meeting summaries, and mathematical tasks referenced by these educators during both observations and interviews as shown below:

Table II *Sources Of Information In The Dataset*

Type of Data:	Audio Transcript	Field Notes	Documents Collected
Dec 2014 Focus group	x	x	
<u>Observations:</u>			
Jan 2015 / 3 hrs	x	x	x
Feb 2015/ 2 hrs	x	x	x
Mar 2015/ 1 hr	x	x	x
Apr 2015/ 1 ½ hrs	x	x	
May 2015/ 2 hrs	x	x	
June 2015/ 4 hrs	x		x
<u>Individual Interviews:</u>			
April 2015 (Erin, teachers -Phil, Jack)	x	x	x
May 2015 (teachers Melissa, Kara, Barbara)	x	x	
June 2015 (Kathy)	x		

These multiple forms of evidence not only supported thick descriptions (Merriam, 1998), but also helped strengthen study validity. For example, I relied on questions posed in individual interviews to confirm or alter researcher impressions about observed interactions or socialized comments made during the initial focus group. In addition, document analysis of assessment problems or curriculum materials helped situate participants' casual references to boundary items

in professional conversations. Finally, access to the facilitator's meeting note summaries helped clarify the elements she thought most important in observed team meetings.

In order to establish more reliable findings, I used a post observation rubric (Appendix B) and semi-structured interview protocols (Appendixes C and D) to guide data collection, based on the study's research questions and theoretical framework. These instruments drew upon situated learning theory's description of learning as a social practice that is negotiated, contested and often conflictive as participants work out new ideas about practice (Lave & Wenger, 1991; Wenger, 1998). I also relied on defined terms and approaches from Knapp et al. (1998), Weick (1995), Stein and Coburn (2008) as well as Kaufman and Stein (2010) to describe constructs under study. In addition, I consulted other researchers' instruments to incorporate easily understood and approachable language for interview participants (Parise, 2011).

Again, inter-relationships among participants, context, and problems of practice highlighted within a situated learning perspective (Brown, Collins & Duguid, 1989; Lave & Wenger, 1991) contrasted with policymakers' more linear theory of action linking a couple of educational variables to simplify instructional choices and improve student outcomes. In addition, Knapp et al.'s (1998) view of three different policy convergence conditions also aided protocol development and information gathering about the variety of possible experiences as teachers implement new standards, student assessments, and evaluation systems nearly simultaneously. Finally, given the many subparts and inter-relationships in this study's conceptual framework, before research got underway, I created a grid of concepts and operationalized measures as outlined above, and mapped them onto data sources to ensure a range and sufficient information gathering.

Initial Focus Group Surfaced Participant Background Information

An initial focus group probed the teachers', math facilitator's, and principal's then current expectations for the school year's collective, professional discussions related to CCSSM implementation in their district. The goal of this focus group was to gather beliefs and expectations about this team's informal opportunities to learn about CCSSM aligned instruction, before observations began. General questions elicited background information, grade level, and school community experiences, as well as current perceptions of instructional needs to improve student learning. In addition, this group interview helped surface focal participants' baseline beliefs about instruction in the current policy environment. From a research perspective, the social nature of this initial information gathering helped me practically establish my interest in how this team of educators worked *together* to make sense about problems of practice. Secondly, answers to semi-structured questions also revealed how individuals built upon one another's ideas (or not) as well as revealed the extent to which they were familiar with key events in others' professional narratives. Thirdly, asking participants to provide some information in written form before sharing their thoughts aloud helped separate individual beliefs and group "ways of being" related to practice. Thus, knowing educators' individual thoughts on what constituted "good math teaching" greatly enhanced researcher understanding about subsequent observations and was incorporated into the individual interviews to solicit participants' thoughts on how policy implementation underway might change what good math teachers do. Finally, initial group interview aimed to establish the study's focus on process description, rather than researcher evaluation of the group in any way, and address confidentiality concerns.

Having gleaned both educators' background information and their core beliefs about what constituted high quality math instruction in the focus group, I then began the first half of

observations of the team during their weekly meetings or other common planning times. During this period, use of the post-observational rubric helped synthesize initial researcher impressions of interactions among educators and guided construction of field notes that supplemented transcripts of observed sessions.

Individual Interviews Probed Participants' Convergence Experiences

Roughly halfway through the observation period, I interviewed individual focal participants using a semi-structured interview protocol. Expanding on the design of the post-observational rubric, the second interview guide focused on asking participants directly about their own convergence experience and other variables of interest such as practice, sensemaking, reliance on boundary objects, and practice dilemmas. More specifically, I probed educators' perceptions about their experience making sense of CCSSM aligned instruction, student assessments, and new evaluation protocols within the current policy environment. These self-reports were integral to substantiating both findings and non-findings related to:

1. Implementation of CCSSM aligned instruction in relation to content coverage and reaction to new standards as math educators, learners, and/or members of particular school community; perception of greatest challenge to their own practice, beliefs, subject knowledge, and experience being evaluated as a math educator.
2. the ways in which they make sense of new instructional for mathematics; usefulness of opportunities to learn for making instructional change; saliency of boundary objects and why; gaps in what they want to know?
3. the role and scope of aligned student assessments for inducing practice change and own performance evaluation; expectations for the roll-out of the new assessments;

any experience with new evaluation protocols; perception of how the implementation of standards, student assessments, and a new teacher evaluation model seeks to affect instruction and practice measurement.

Through these interviews, I sought to uncover teachers' questions, concerns, and comfort levels regarding CCSSM aligned instruction, including the new assessments and teacher evaluation experience, as math educators, learners of new policy, and members of a particular school community. I asked participants about their satisfaction with how the structure, content, and format of the observed group meetings did/did not help them make sense of new practice demands. Finally, I explicitly asked each of them to describe practice related conflicts they experienced or foresaw in relation to the new student assessments and the district's recently revised teacher evaluation protocol.

During these interviews, I followed Knapp et al.'s (1998) guidance about other elements that may draw out teachers' feelings about policy convergence. For example, these researchers found that during the implementation of several reform efforts,

...various things are likely to accumulate on the plate of teachers and other professionals working in the schools: expectations and responsibilities, theories and metaphors of change, resources, contradictions, and exhortations. It remains to the frontline professional to sort this all out, to make sense of these pressures, and to integrate what is useful into the flow of day-to-day work, while screening out less useful or more problematic demands. (p.409)

Thus, probing teachers about their expectations, responsibilities, theories, metaphors, resources, and contradictions offered several different ways to elicit their understanding of what might contribute to how they were reconciling new policy directives with past practice.

Data Analysis

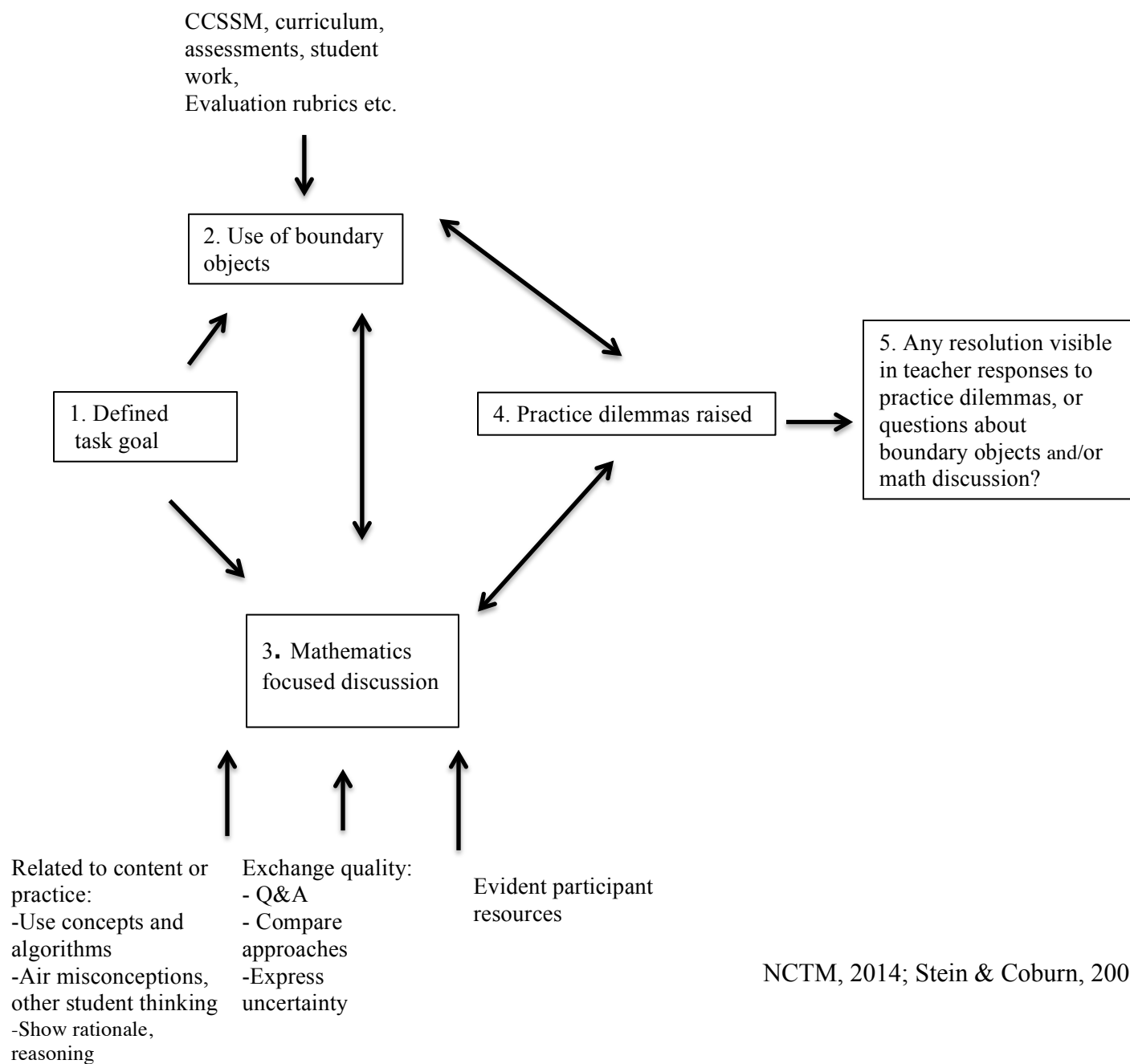
In actuality, analysis began with transcription of observed sessions' audiotapes following conventions found in Psathas (1995) and supported by field notes as a means of "demonstrably" representing the groups' experience (p.46). It is important to know that I personally transcribed all the qualitative information collected to immerse myself in the data. In keeping with my research focus on collective professional conversation as a means of evidencing the often obscured act of sensemaking (Weick, 1995), this decision helped me remain as close as possible to the rhythms and patterns of educators' actual talk. The study's phenomenon of interest as well as the natural school settings in which observations and interviews took place influenced my choice of transcription method. In order to represent participant speech as closely to how it seemed to occur in a social context, I opted to transcribe all sessions verbatim and minimally filtered the text (Schiffrin, 1994). For example, I used as little as punctuation as possible so that changes in tone, rather than a period or question mark, often signaled the end of a speech turn. Transcription also captured overlapping speech, grammatical errors, and filler words such as yah or uh to the extent possible (Sacks et al, 1974). Treating all words or spoken utterances as part of the text and minimizing the use of punctuation as ways to limit further interpretation of that text aimed to emphasize the inter-relationship of participants' words. This arrangement seemed consistent with both the situated perspective of this research and the proposition that professional conversation in some informal opportunities to learn can function as a platform for collective sensemaking about practice.

Research questions further guided qualitative data analysis that incorporated several different approaches, including conversation analysis of teacher group interactions, focused coding of observations, documents, and interviews, as well as construction of analytical tables

for presentation of findings (each described in detail below). As I collected the data, I periodically drafted memos to document conflicts among coding categories, developing themes, and emerging questions as a precursor to deeper analysis to reduce the data further (Richards, 2009). Pattern matching, explanation building, as well as addressing rival explanations helped strengthen both findings and non-findings (Richards, 2009). In addition to triangulation of data sources (observational records, interview transcripts, field notes, and documents) where possible, member checking of selective findings (Miles & Huberman, 1994) also helped enhance study creditability.

The following figure summarizes both conversational and conceptual elements that helped identify whether and how participants discussed ideas about or problems of mathematics practice in opportunities to learn. Ultimately, it guided my examination of teachers' time on topic, observed topic frequency in interaction, and quality of exchange to approximate group interest in mathematically related topics.

Figure 2. Conversational representation of sensemaking about mathematics practice



This figure relied upon elements from all three analytical approaches: conversational analysis helped evidence both the task/goal and the rationale for how mathematics conversations did/did not take place; focused coding of theoretically derived constructs identified boundary items or important mathematical concepts; and both conversational and conceptual coding helped substantiate how educators interrogated key practice dilemmas.

More specifically, conversation analysis of observational and interview data first aided understanding about the structure of participant talk, as the method “has been consistently oriented to the discovery, description, and analysis of methodical occurrences, of the formal procedures that are used by members in accomplishing everyday social actions” (Psathas, 1995, p. 15). In fact, Schifffrin’s (1994) conception of discourse as “a particular focus on language use,” arising in conversation as an indicator of participants expressing their own sense of social order (p. 20) was particularly germane when contextualizing the range of informal opportunities to learn and educator roles (e.g., learner, math educator, and community member) observed. First level coding related to participants’ communication helped identify separate topics, range of discussions, and length/frequency of key practice mentions. In analyzing observations, I first identified the topic discussed, including time elapsed in conversation, and nature of participant turn-taking (Sacks et al, 1974); then searched for evidence of selective themes related to the theoretical framework/prior research (Ryan & Bernard, 2003).

For example, constructs such as policy convergence, sensemaking, boundary objects, participation structure; participant resources; mathematics-focused conversation and teacher roles served as key categories for investigation and the basis of focused coding. Where possible I used existing definitions and/or terminology from the NCTM (2014) regarding CCSM practices, supporting beliefs, and teaching behaviors in developing observational and interview protocols

as well as in focused coding of the data. This body of content experts has described practice ideals for not only the CCSSM, but for the previous two iterations of mathematics standards, and as such, their language and descriptions remain well known throughout the field of math education.

A detailed coding manual documented focused codes drawn from literature about policy convergence, professional learning, and opportunities to learn. Appendix E summarizes the focused coding scheme used to analyze the dataset. I used Atlas.ti to organize transcripts, documents such as agendas or related discussion materials, as well as corresponding analytic memos to facilitate conceptual coding across the data set and aided triangulation. As expected, analysis was iterative, with individual codes, code categories, and themes revised over the project (Miles & Huberman, 1994). The process followed the steps Richards (2009) outlined for analytical coding “that comes from interpretation and reflection on meaning” (p. 102), including looking for similarities and differences among similarly coded excerpts as well as expanding or contracting the category as necessary. Initial code categories began with terms identified in the conceptual model and evolved towards more specific meanings as well as resulted in new categories that captured emerging ideas as more of the data set was analyzed.

For example, I began focused coding to identify policy linkages (e.g., mentions of assessments and/or evaluation in relation to the CCSSM), boundary items (Wenger, 1998) in the form of artifacts and leader direction, and participant resources (Stein & Coburn, 2008) such as expressed beliefs or prior knowledge about mathematics. Interviews also probed participants’ relevant beliefs and experiences to focus researcher interpretations of possible sensemaking events in observations. I also analyzed these transcripts thematically as just described. I reviewed documents referenced during both observations and interviews, including policy language,

curriculum, district priorities, and an evaluation rubric as possible cues or supports for sensemaking. These items were consistent with my interest in how boundary objects, often taking the form of artifacts, tools, or concepts, are developed in one community of practice and used by another to focus communication and meaning (Wenger, 1998).

The third wave of coding combined analysis of conversational moves and data that pointed to conflicts about practice. Over time, patterns of interaction evidenced the group norms, routines, and rules that helped structure participation (Wenger, 1998) and facilitated teachers' opportunities to learn (Kaufman & Stein, 2010; Spillane, Parise, & Sherer, 2011). In addition, I first noted all expressed practice dilemmas whether or not they pertained to the policies under study, and later reduced the data further to episodes of inferred sensemaking about CCSSM-aligned mathematics or assessment. Memos described how at times teachers built upon questions or comments from colleagues when expressing their views about practice elements. For this behavior indicated some reliance on others' beliefs, experiences, subject knowledge or role (intangible participant resources). In that regard, analysis of the talk examined what teachers said about their practice in an effort to describe the process by which they noticed or questioned new information, referred to various tangible and intangible resources, reconciled divergent beliefs, and/or generated new ideas about practice (Weick, 1995), as sketched in Figure 2 above.

Finally, I distinguished between major and minor practice dilemmas by examining whether an educator posed an open-ended problem of mathematics practice relevant to the group present that made or elicited references to multiple resources, and generated different points of explanation. I also viewed repetition as a proxy for importance and/or lack of resolution. In truth, analysis of the observational data showed many more times when participants' assertions about mathematics practice or beliefs did not elicit follow-up responses

or deepen the conversation further, and where divergent views were heard but not reconciled. In this way, the amount of times participants raised practice dilemmas in the dataset (76, the most frequent code) dwarfed the number of incidents in which teachers attempted to make sense of expressed uncertainties about practice, as only about a third of the time did participants respond to another's dilemma in any way. In terms of what constituted an "episode" of inferred sensemaking, episodes denoted "shifts in topic and/or participation" (Horn & Little, 2010, p. 185) at a medium grain size that "examined turn-by-turn movement in conversation to illustrate specific interaction approaches," with a focus on the participants' exchange itself (Kosko & Herbst, 2011, p. 591). Specific criteria for closer analysis of an episode included: at least two educators involved in a collaborative discussion related to mathematics practice; that was substantive content-wise and dominated by teachers (Bannister, 2015); related in some way to one or more of the three policies under study, and arising at least twice during the data collection period.

As part of documenting the most important practice dilemmas discussed over the observation period, I used the Atlas.ti Code Manager and other features to analyze and reduce the data further (Miles & Huberman, 1994). This process also helped strengthen researcher interpretations about episodes of sensemaking.

When examining key practice dilemmas for these educators, I triangulated information from interviews, observations, and collected documents to evidence patterns of interaction between leaders and other participants, as a precursor to establishing levels of sensegiving as well as any noticeable sensemaking conditions. More specifically, and drawing on conversational analysis of select episodes, field notes, interview data, and associated documents, I looked for interactional patterns that both supported or detracted from teacher sensemaking

over the data collection period. When data collection precluded establishing connections in the above ways, the theoretical framework and actual data guided presentation of findings based on what evidence emerged.

Design Strengths and Weaknesses

Articulated linkages among the research questions, theoretical framework, collection of multiple data sources, and specific analysis techniques strengthened case study findings. The propositions underlying the study directed the gathering of both confirming and disconfirming evidence of policymakers' stated logic in linking implementation of the CCSSM, aligned student assessments, and professional evaluation systems. In fact, this study's situated perspective foregrounded relationships among participants, their resources, and learning environment to policy convergence obscured by a variable based approach to policy linkages and outcomes. I purposefully chose a case with characteristics that might test policymakers' implicit and explicit assumptions about the power of mandating coupled policies to effect instructional change rather than rely on the messier and longer-term process of teachers' crafting coherence about multiple policies in implementation (Honig & Hatch, 2005). In addition, a single case study allowed me to analyze teachers' convergence experiences, interactions with each other and various knowledge resources, as well as expressed practice dilemmas at a very deep level.

In terms of this research's "internal value" (Howe & Eisenhart, 1990), few ethical concerns resulted from the proposed study design elements, nature of the research questions, and adult participants involved. As described above, the following factors mitigated risk to subjects: observations and interviews were audiotaped, the subject matter under investigation was not sensitive, participants' names and employing district remain confidential, and all those involved were aged 21 and over. As is customary, each participant, whether focal or not, provided

informed consent and agreed to participate in interviews outside the regularly scheduled group observations, if asked.

In addition to ensuring design and analytical steps to foster internal validity, this study's look into how this group of teachers experienced policy convergence within select informal learning opportunities about mathematics instruction was of "external value," generating timely information about the first nearly national implementation of K-12 content standards and more centralized assessment of student learning (Howe & Eisenhart, 1990, p. 7). In terms of theoretical generalizability, the study drew heavily on previous findings from Coburn (2001, 2004, 2005), Kaufman and Stein (2010), and Stein and Coburn (2008) in a new and more complicated policy context.

At the same time, the case context was neither representative of mainstream public educational conditions nor widely replicable, which hampers generalizability of some empirical findings. An observational focus on informal opportunities to learn among a single group of educators skewed the balance of findings, as did the study's duration and timing of data collection in advance of the first reporting of PARCC results. On the one hand, gathering evidence largely from teachers' participation in informal opportunities to learn fit nicely with this study's ultimate interest in the sense that they might make about practice, for sensemaking often requires a pause in the ongoing action to notice, question, and consider alternatives. Observed meetings sometimes provided space for teachers' reflection or questioning among colleagues about problems encountered in their classroom. On the other hand and as Horn and Kane (2015) noted, teachers reconstructed only selective aspects of their classroom practice in collective conversations, which necessarily limited insight into their true practice choices. Therefore, whether teachers' enacted instruction truly aligned with the new standards or

remained aspirational as found in Spillane and Jennings (1997) and Cohen (1990) lay outside the scope of the study, which focused on educators' asynchronous professional conversations rather than observed in-classroom activity. Furthermore, the data collection period limited observation of longitudinal developments related to teachers' opportunities to learn and issues raised might not be representative of participating teachers' implementation experience over time. Certainly as implementation of the aligned policies continues, other new uncertainties may take their place and they too remained outside the scope of this study.

Finally, depth of experience as an individual researcher likely impacted findings as well. Certainly my presence as a researcher in team meetings had some effect on participants, regardless of how unobtrusive I aimed to be or how little they addressed me directly as observations continued over time.

Conclusion

This single case study was revelatory given the sixth grade teams' access to daily common planning time, the expertise and resources of a dedicated mathematics facilitator, and established collaboration norms for discussing mathematics practice. This research was designed to test the strength of policymakers' variable-based model as these teachers learned about new demands for practice and began implementation. As such, it added timely information about middle school educators' lived experience learning about and making sense of converging policies in an accountability driven environment for public education. Actual findings from the study now follow, presented according to the major components of the theoretical model and focusing where possible on observed elements consistent with Figure 2 above.

Findings

After a short overview and summary of key local factors, findings are presented according to the major components of this study's theoretical model: 1) how observed teachers experienced convergence of policies aimed at changing mathematic practice; 2) what boundary items, participation structure, and participant resource elements figured most prominently in observed informal opportunities to learn; and 3) how these opportunities seemed to shape both the sensemaking process and sense that was made of two particular practice dilemmas that emerged over the observation period.

Overview

Within observed informal opportunities to learn, the team spoke about teaching and learning issues about half of the time, or *two times the rate* found in Supovitz's (2002) study of supported teacher collaboration as part of an instructional improvement program. Related to the policies of interest, these math educators paid much attention to aligning instruction to the Common Core standards, largely described the PARCC assessment as a time impediment to the flow of good math teaching, and did not mention the subject of professional evaluation or future inclusion of student assessment results. As expected, participants' experiences as math educators, learners, and members of a distinct community figured into how they experienced policy convergence and reconciled problems of practice. At the same time, these teachers' convergence experience deviated from policymakers' intent to link standards' aligned instruction with accountability measures as graphically depicted in the left hand side of the theoretical model.

Professional discussions indicated these teachers decoupled the trio of policies aimed at influencing classroom instruction. Instead they focused to a very great extent on ensuring

instruction aligned with CCSSM content and practices, describing the latter as highly congruent with their instructional beliefs. In contrast, stated beliefs about high quality math teaching as well as local factors like a history of high student achievement despite traditional low values for standardized testing, leader direction, and clear community expectations all supported teachers' de-emphasis of the PARCC assessment and future changes to the district evaluation model. Thus, the implementation of multiple policies operated less linearly in this community than how policymakers intended.

To elaborate, conversational mentions of the CCSSM, PARCC testing, and new professional evaluation criteria were tracked throughout group observations in the first half of 2015. In every observation, teachers brought up the new standards, which accounted for the CCSSM having the largest number of individual policy mentions (54). Although teachers referred to the PARCC test (26 times in observations) and shared their opinions about the test or its administration (10 times over the same period), these far briefer mentions largely related to missed or interrupted instruction in their own classrooms. Again the fact that teachers' professional evaluations must include standardized measures of student growth in 2016-17 after a pilot in the upcoming school year *did not come up at all*.

Within opportunities to learn, teachers along with a math facilitator and the Clark Middle School principal discussed problems of practice arising from the current policy environment as well as from local community concerns. As a point of reference, analysis revealed a 60/40 split between mentions of the former and the latter over the observational period. In the course of such discussions about practice concerns, teachers referred to many boundary items and called on their own and one another's classroom experience, content knowledge, and willingness to innovate. However, despite exceptional resources and commitment to weekly informal learning

opportunities, this group of teachers reacted to the policies under study individually rather than convergently. Their comments and described behaviors indicated they did not experience them as simultaneous and coordinated levers to influence classroom instruction. For example, Jack matter-of-factly said, “the assessments should be aligned to the standards, right, and the evaluation is going to be eventually aligned to some of the assessments so I mean those are the relationships but [beyond that] I’m not really sure” (J. Monroe, interview, April 20, 2015).

Melissa also seemed to nominally link the three policies, commenting, “I think all three are tied right now and are so unknown, I almost feel like it’s all going to flop in our face. You know like I still wonder if a year from now if PARCC will be the same as it was this year” (M. Gordon, interview, May 1, 2015). And yet, not all teachers agreed. Phil did not see any relationship among the three policy changes in Fairfield Oaks, although he imagined that for other districts they might involve “a philosophical shift” (P. Patton, interview, April 13, 2015).

At the same time, observed teachers repeatedly discussed the importance of alignment, coherence, assessment, and improving their math teaching, the very benefits policymakers sought in linking policy actions to influence instruction. For example, they repeatedly talked about the scope and sequence of CCSSM aligned content and each teacher individually described practice ideals in ways that seem consistent with the CCSSM practice standards. Yet, teachers seemed very unsure of how an aligned assessment like the PARCC would provide actionable information to inform their teaching (or their students’ learning) and remained skeptical that the PARCC would figure in this district’s future professional evaluations. One summarized the effects of the three policies as “I think only the curricular shifts impact me on a daily basis with the exception of the fact that the testing changes impacts my ability to teach on a regular basis

because of the time I now have [to be] out of the classroom” (M. Gordon, interview, May 1, 2015).

Said differently, these teachers appeared very motivated to shift instruction toward CCSSM content and practices on the basis of the standards alone. They worked to do this without the threat of accountability measures in the form of aligned student assessments that could affect their own professional evaluations. More specifically still, these teachers saw little value in the PARCC both as a standardized assessment for their students and as a meaningful measurement of their own performance. Even after probing in individual interviews, some educators had relatively little to say about mandated inclusion of growth measures in future evaluations, except that the district might substitute other normed assessment data (K. Wise, observation, March 19, 2015) or teacher-developed and scored cornerstone assessments (P. Patton, interview, April 13, 2015), points initially made by the district’s Director of Curriculum to the researcher before observations began (C. James, field notes, May 21, 2014). Thus, teacher responses to the new student assessment and their uncertainty over its inclusion into their professional evaluations aligned with leader sensegiving rather than the objectives of tighter policy coupling.

Teachers certainly recognized evaluation changes were coming, referencing Fairfield Oaks’ plans for complying with the PERA mandate from a recent district-wide professional development meeting that addressed the subject (K. Bishop, interview, May 1, 2015; M. Gordon, interview, May 1, 2015). They understood a joint committee of board members and teacher representatives would determine what types of assessments would factor into evaluations for their district. They expected the evaluator and individual teacher would determine the actual choice of assessment, depending on the fit with annual performance goals. Either way, no

teacher seemed clear on exactly how assessments would figure into their individual 2016-17 evaluations. No one foresaw how such changes would impact their teaching and individual teachers expressed only limited concern about the impending evaluation changes. At the time of interviews, details were simply “unknowns” (M. Gordon, interview, May 1, 2015) and to be worked out in the upcoming school year. Again these reactions seemed in keeping with district administrators’ ongoing high level of attention toward classroom instruction and more limited communication about yet to be finalized evaluation changes (C. James, field notes, May 21, 2014; K. Wise, interview, June 26, 2015).

Finally, district information about the value of standardized testing in general, leader direction about the PARCC assessment in particular, and high opt-out rates as a community response seemed salient to how observed teachers experienced weak convergence of multiple policy changes. Student achievement levels as measured by standardized assessments historically have been very high in Fairfield Oaks, despite a low value placed on such measurement over time (K. Wise, interview, June 26, 2015). In conjunction with specific leader messages about the PARCC, strong community reaction (about a third of district students elected to opt-out of the test) helped support a view that the PARCC was not a legitimate use of teaching/learning time. These assessment-related factors seemed important and timely information for teachers deciding which policy signals to pay attention to, and for what end in this school community. In sum, district history, leadership direction along with some parents’ explicit agreement about PARCC as a low priority, provided a compelling rationale to minimize new assessment policy during this initial implementation period.

The Local Context in Which Teachers Experienced Policy Convergence

Local values, organizational structures, and response mechanisms helped teachers filter all sorts of information, including the policies under study. Four local context factors seemed particularly relevant to how this middle school mathematics team experienced policy convergence and divergence in the Fairfield Oaks district: 1) high values for teacher agency; 2) low values for standardized test data and teaching to the test; 3) relative independence from state sanctions given traditionally high student achievement and near total reliance on local funding; as well as 4) attention paid to parent feedback and concerns. Unpacking these factors was critical to appreciating how these educators considered new information related to policy convergence and interpreted implications for practice.

To begin, the concept of teacher agency arose in observations and some interviews as a prized value of Fairfield Oaks. Educators at all levels described the importance of teacher investment in understanding and directing curriculum changes (C. James, field notes, May 21, 2014), teacher creativity in interpreting curriculum and standards to make instruction dynamic (J. Monroe, observation, February 9, 2015; P. Patton, interview, April 13, 2015), and teacher voice in revising new evaluation criteria (K. Bishop, interview, May 1, 2015). The concept of agency underlay the choice of curriculum materials (observations, May 7, 2015; June 15, 2015) and permeated professional conversations about the different ways teachers met the needs of their students (observations, March 19, 2015; June 15, 2015). In turn, the Clark principal reiterated that teachers need not approach a particular concept the same way and she urged them to innovate and try new things in their classroom, saying “it’s not aligning everybody to do all the same things, cause I think you can all do it your own way. And I think you should” (K. Wise, observation, June 15, 2015). So this team may have agreed on a common scope and sequence (E.

Hooper, GR 6 Math Meeting 2014-15 notes, June 15, 2015) as well as coordinated timing spent on topic to some extent (observation, June 15, 2015), but they freely chose which materials to use when, how, and for how long with their individual classes. Said another way, Phil employed long-term projects to involve students at different levels while others relied more heavily on the base curriculum and tasks from virtual sources. In sum, these sixth grade teachers could provide different learning experiences for children as long as they covered agreed upon topics and concepts over the year.

Secondly, most of the educators commented in some way about Fairfield Oaks' historical lack of focus of standardized test results. Correspondingly, their current concerns about standardized assessments went far beyond imposition of the PARCC test as teachers were generally critical about the amount of time spent on non-curriculum based assessments such as diagnostics for an intervention (observation, January 15, 2015) or another assessment given three times per year to measure student growth (observation, March 19, 2015) on top of the PARCC. Overall, these educators spoke about how they favored curriculum-based formative and summative measures for actionable information gathering about student learning rather than standardized tests (M. Gordon, observation, March 19, 2015; J. Monroe, interview, April 20, 2015; P. Patton, observation, May 7, 2015; K. Wise, interview, June 26, 2015). The Clark principal noted standardized test scores comprised one of many lenses with which teachers viewed student progress and said she was unsure "if we're ever going to get to a place where standardized assessments are really highly, highly valued here" (K. Wise, interview, June 26, 2015). This low reliance on standardized measures has translated into freedom from teaching to the test, but sometimes made it more difficult to quantify student progress for parents and the broader community, who over time became more attuned to comparative data, given technology

advances and media coverage of accountability. Yet, despite a historically low value on standardized measures, students in this district have continued to score at extremely high levels, whether measured by the ISAT, annual growth assessments for grades 3-8, or the standardized test used for Belmont High placement in eighth grade (C. James, 2014 District Assessment Data Review to Board of Education, October 21, 2014; 2014 Placement Test Results to Board of Education, February 24, 2015).

Relatedly, Melissa, Kara and Jack echoed Erin's initial assertion (focus group, December 18, 2014) that teachers did not teach to the test in Fairfield Oaks and expressed their gratitude for working in such a district (K. Bishop, interview, May 1, 2015; M. Gordon, interview, May 1, 2015; J. Monroe, interview, April 20, 2015). To explain why she has not taught to the test, Melissa first mentioned how she aimed to develop learners' mathematical reasoning by preparing them "... to be deep thinkers, to be deep analyzers and to provide them with those open-ended tasks within a mathematical context" as an experience, rather than as a practice problem in PARCC format (M. Gordon, interview, May 1, 2015). She believed this preparation would serve students well on the new assessment and therefore, obviate the need to practice for it. In addition, this teacher's remarks indicate a strong belief in students' capacity to develop as mathematicians, which other teachers also expressed in observations and interviews.

Melissa also explicitly contrasted her current teaching approach with her earlier experience in another district, noting

I don't think we give them a problem thinking this might be on a PARCC test like I did at my previous district when we'd give them an 'extended response problem' and practice this like it was an extended response. We don't do this in Fairfield Oaks or at least in my classroom,... the experiences we give them are, are practice

based experiences so when they're taking this practice based assessment they are successful for that. (M. Gordon, interview, May 1, 2015)

Melissa's distinguishing between the freedom not to teach to the test in her current position from her experience in another district was just one of several times participants saw educational decision-making in Fairfield Oaks as set apart from that of other districts.

Elaborating on their experience that Fairfield Oaks has never been “a teach to the test” district (focus group, December 18, 2014; K. Bishop, interview, May 1, 2015; M. Gordon, interview, May 1, 2015; E. Hooper, interview, April 9, 2015; J. Monroe, interview, April 20, 2015), educators said instead they focused on teaching for mastery (observation, March 19, 2015; J. Monroe, interview, April 20, 2015) and other “immeasurables” such as development of the whole child, which Phil described as “what we want our kids to be as citizens and as learners” what counts when “...they are thirty years old as opposed to ...fourteen” (P. Patton, interview, April 13, 2015). Another teacher wondered aloud with his colleagues about how teaching for mastery and conceptual understanding rather than computational skills may compromise standardized test scores in the short run (J. Monroe, observation, March 19, 2015). Conversely, Kara speculated teaching high achieving students for conceptual understanding actually helped keep those scores high (K. Bishop, interview, May 1, 2015). Interestingly, none of these teachers definitively linked their teaching proficiency or approach with students' standardized performance: Phil equated the way he taught math with students' long term development; Jack questioned if teaching for mastery may tamp down student scores; and Kara gave a lot of credit to the intellectual capabilities of children in her classroom.

Thirdly, in addition to enjoying high achievement levels, Fairfield Oaks' near total reliance on local funding distanced the district from threat of sanctions. The issue of the district's

funding profile first surfaced when the Clark principal explained why these teachers have little to fear when families elected to opt-out students from PARCC testing at rates far exceeding the allowable 5% rate. Kathy noted that the state would audit Fairfield Oaks at the district level, an annoyance in comparison to what another district relying on state funds to educate students might face (K. Wise, observation March 19, 2015). Yet, she admitted that recent state mandates made it increasingly difficult for Fairfield Oaks to operate as it traditionally has:

... we're a public school that has behaved for so long like a private school and it gets really hard when you're getting more and more of these mandates from the state which doesn't understand the way that we teach and doesn't always account for the whole child. (K. Wise, interview, June 26, 2015)

Here the principal framed a broad conflict between this district and state policymakers in terms of educational objectives and approaches that underlay educators' critical view toward state actions with which they disagreed. For the purposes of my argument, delving into exactly how Fairfield Oaks has acted like a private school is less important than highlighting the principal's assertion the state misunderstands Fairfield Oaks' approach to teaching the whole child and set policy more narrowly than was comfortable for district educators.

Later, the principal elaborated on the relationship among teacher agency, local funding, and independence from sanctions when more specific to mandated assessments, she questioned, is this really helping a child or this helping somebody in an office somewhere prove that their product is really useful? ... Here state funding doesn't mean a whole lot to us so we're able to take that stand. That's not the reality for so many other places. It still makes you feel kind of icky as a teacher that really cares about kids. But when it comes down to whether you're going to have

enough desks in your room for your kids or not, you'll teach to the test.

(K. Wise, interview, June 26, 2015)

Like Melissa above, Kathy saw a critical distinction between instructional decision-making authority in Fairfield Oaks and “other” districts’ more limited options. What Kathy added here was how Fairfield Oaks’ funding allowed teachers to act in accordance with their instructional beliefs and refrain from teaching to the test. Arguably, these choices helped sustain greater professional autonomy too, which in turn, translated into higher expectations for their own professional practice. Kara described the implied trust that came from administrators treating teachers as the “content experts” (interview, May 1, 2015) while Kathy and other teachers also attested that teachers’ ability to choose materials, develop various assessments, and create involved projects for students added complexity to their work.

Lastly, and despite students’ traditionally high achievement levels, both the Clark Middle School principal and teachers acknowledged the community’s attention to a particular set of test results that determine high school placement levels. Placement exam results coupled with students’ high school grades have functioned as important indicators for this district. Moreover, Fairfield Oaks’ student representation in highest-level subjects and freshmen year grades received at Belmont High have recently declined for no glaringly obvious reason (K. Wise, observation, March 19, 2015). For now it is important to note that the Clark principal twice advised her teachers to consider what practice elements may have contributed to these outcomes (observations, March 19, 2015; June 15, 2015). The amount of time devoted to this principal-led conversation was one measure of priority placed on about differentiated instruction for this subset of learners. Another measure was the fact it took place following public discussion at the Board level (observation, March 19, 2015) and with district direction to do so (K. Wise,

interview, June 26, 2015). Erin also mentioned a likely fear of continued public comparison of outcomes (E. Hooper, interview, April 9, 2015) as further impetus for the conversation, an element Firestone, Mayrowetz, and Fairman (1997) and Bulkely, Fairman, and Martinez (2004) highlighted in research comparing pressures for change in high achieving districts. Therefore, parent attention to the Belmont High placement exam exerted evident influence on district/school level responses at a time when state policymakers emphasized another assessment strategy based on the PARCC.

In conclusion, local values placed on teacher agency, the emphasis on “immeasurables” vs. standardized measures of student learning, freedom from negative state sanctions, and parent attention to high school placement results contributed to the ways in which teachers initially interpreted the imposition of new standards, assessments, and evaluation criteria. As a group, these local factors exerted a powerful influence on teachers’ understanding about implications of policy signals and leader messages in this school community. With these factors identified, now discussion takes up how teachers experienced convergence of the three policies, as depicted on the left hand side of the theoretical model.

Teachers Experienced CCSSM Practices and Content Shifts More Convergently than Divergently

Overall, the sixth grade team consistently used opportunities to learn to advance their understanding about the CCSSM and deliberated on practice issues arising in classroom implementation. In every observed professional conversation, teachers mentioned the standards and influences on curriculum and instruction. They also commented upon them at length in individual interviews. Interviews also surfaced each member’s strong expressed support of the

practice standards, although teachers differed in how they chose to enact standards-aligned instruction. In addition, ongoing professional conversations about the scope, sequence, and alignment of new curricular materials evidenced teachers' continued high level of attention to the new content standards as they planned and facilitated instruction, two years after beginning implementation (C. James, Math Committee Implementation Update to Board of Education, April 29, 2015). Finally, key communication vehicles such as the Middle School Improvement Plan (SIP) and student report cards measured growth of students' use of the CCSSM practices, indicating priority attention to successful implementation throughout the system.

The CCSSM practice standards were an especially strong point of shared agreement. All the teachers and math facilitator said that the CCSSM practices felt very comfortable. In fact, math facilitator Erin explicitly stated that the practice standards backed up or reinforced practice choices they made years ago (focus group, December 18, 2014; E. Hooper, interview, April 9, 2015), before standards had codified them. Teachers' description of instruction with student-to-student discussion and modeling (J. Monroe, interview, April 20, 2015), calling for shared reasoning, relying on deep problem-solving (focus group, December 18, 2014; M. Gordon, interview, May 1, 2015; E. Hooper, interview, April 9, 2015; P. Patton, interview, April 13, 2015) and adapting to student thinking (K. Bishop, interview, May 1, 2015) resonated with Erin's assertion. Teachers also commented in observations and interviews that the practice standards reflected their beliefs about practice and instructional choices. However, some teachers professed different levels of fidelity to standards aligned instruction, ranging from Kara's stated reliance on CCSSM aligned curricula and tasks as a new teacher (K. Bishop, interview, May 1, 2015) to veteran Phil's belief that standards are guidelines that a teacher must creatively interpret for his students (detailed below). Although both teachers referenced their experience levels in

partial explanation of their particular allegiances to standards alignment in instruction, factors such as personal beliefs about the need for coherence to underpin “good math teaching” or reliance on an expanded network of practice resources might also help explain this range of opinion regarding the role of standards.

As background, participants’ descriptions of math teaching ideals during the initial focus group seemed generally consistent with the CCSSM practices. The table below synthesizes this group’s initial comments about what good math teachers do:

Table III *Elements Of “Good” Math Teaching*

Educator	Key Practice Dimensions Mentioned
1. Jack	Safe environment, discussion among students, flexible teaching responses
2. Barbara	Safe environment, mistakes as learning opportunities, students share thinking
3. Kara	Know students on a personal level to make meaningful connections
4. Kathy	Listen and anticipate students’ thought patterns, analysis, misconceptions
5. Phil	Find students’ emotional connection with math, safe environment, mistakes ok
6. Erin	Understand student thinking, ensure multiple strategies, honor mistakes
7. Melissa	Ensure multiple access points for learners, listens more, talks less, collaborates

(field notes, December 18, 2014)

In truth, participant mentions of what constituted good math teaching did not explicitly include language from the eight practice standards, written from the perspective of “what students are doing when they learn mathematics” (CCSSM p. 8). Instead, their statements aligned more closely to the NCTM’s (2014) compilation of descriptive practices on which the practice standards were based. For example, comparing the above responses to NCTM teacher practices (p. 10), these educators said good math teachers engage with challenging tasks (7); connect new learning with prior knowledge (3,5); acquire conceptual and procedural knowledge (4, 6);

construct knowledge socially (1, 2, 4, 5, 7). As stated in the language of the CCSSM, these responses as a group, arguably reflected the perceived importance of “facilitating meaningful mathematics discourse,” “building procedural fluency from conceptual understanding,” and “supporting productive struggle in learning mathematics”.

As touched on previously, not only did teachers find these good math teaching attributes consistent with their own practice ideals, the Clark SIP goals for 2014-15 explicitly called for progress in certain Common Core practice standards (C. James, 2014-2015 District and School Improvement Plans to Board of Education, November 18, 2014). For the second year, this SIP included goals for monitoring growth in the practice standards, specifically “1a. making sense of problems; 1b. persevere in solving problems; 2. reason abstractly and quantitatively; 3a. construct viable arguments; 3b. construct viable arguments and critique the reasoning of others” (C. James, field notes, May 21, 2014). The Clark SIP also directed classroom teachers to measure student progress in demonstrating the practices using a common matrix three times per year (see Appendix F). Information from this same matrix also figured into the Clark principal’s annual evaluation (E. Hooper, interview, April 9, 2015) and was developed by teachers who “put together rubrics for what to look for as evidence of these practices developmentally across the grade levels, building off what other states have done, some NCTM materials, and their own judgment” (C. James, field notes, May 21, 2014).

This internally developed document seemed an important commitment among leaders and teachers and the community. Use of information from the rubric in the SIP ensured some public accountability of the CCSSM mathematical practices as evidenced by growth in student behaviors (Curriculum Director Report to the Board of Education, June 9, 2015). Student report cards also incorporated information from this matrix to document student growth in the

practices for parents (observation, May 7, 2015). Once more, teachers' central role in the tool's development indicates how administrators trusted teachers as the content experts and supported their desire for professional agency. Thus, Fairfield Oaks embedded measurement of student proficiency using CCSSM practices in key pieces of public communication reaching through multiple system levels: district, school, principal, and individual student. As boundary items, they communicated high priorities on alignment with the practice standards and coherence of student experience to various school constituencies.

In addition to this focus on the practices, teachers' professional conversation naturally turned to CCSSM content shifts, curriculum alignment and topic coherence as the sixth grade team piloted and evaluated new curriculum materials. In brief, alignment with Common Core content standards came up in several ways: related to topic coverage embedded in grade level standards (observation, March 19, 2015); as a tension in adequately differentiating instruction for high achieving students (observations, February 11, 2015; April 30, 2015), and in questions related to the choice of curriculum and supplemental materials (observations, January 15, 2015; February 9, 2015; February 11, 2015; May 14, 2015). More specifically, teachers complained about publishers' rush to prepare new materials resulting in weak alignment (focus group, December 18, 2014; observations, January 15, 2015; February 9, 2015; February 11, 2015; April 30, 2015) and repeatedly asked questions about whether problems or tasks belong in sixth or seventh grade (observations, January 15, 2015; February 9, 2015; February 11, 2015). They also referenced resources like the Illustrative Mathematics website or NCTM Mathematics Teaching in Middle School Journal when delving into the use of appropriate tools as set forth in the CCSSM, like tape diagrams, double number lines, and coordinate graphing to

enhance student understanding through modeling (observations, January 15, 2015; February 11, 2015).

On a conceptual level, Melissa, Barbara, and Kara most often mentioned coherence as they pulled apart curriculum pilot lessons and probed issues of sequence and topic integration. Coherence seemed related to these teachers' interest in aligning their instruction to the CCSSM as it frequently arose when they planned and evaluated curriculum pilot materials together (observations, February 9, 2015; February 11, 2015). The concept sometimes underlay teachers' questions about what constituted a sixth or seventh grade task under the grade specific standards and how best to sequence supplementary materials to advance student learning (observation, January 15, 2015). Finally, Erin, Melissa, and Kara broadly agreed that coherency was very important to moving their instruction ahead (observation, May 7, 2015) and the group made this discussion a centerpiece of their paid summer work, reconciling scope, sequence, and tasks, together as a team (E. Hooper, 6th GR Math meeting 2014-15 notes, June 15, 2015).

At the same time, this group of teachers experienced points of divergence related to CCSSM aligned instruction on both a collective and individual basis. In these instances, teachers moved away from interrogating the standards for understanding and toward how they might fulfill practice ideals *in spite of* CCSSM direction. Extending the previous point about how teachers seemed to work toward coherence in their instruction, on other occasions, teachers spoke out about how greater focus on coherence and tighter alignment at the classroom level could negatively impact student engagement. For example, when teachers attempted to pilot new curriculum materials with as much fidelity as possible, students noticed the monotony of just following the book vs. the variety of unique problems introduced before

and after the pilot period (observation, February 9, 2015; M. Gordon, interview, May 1, 2015). This feedback concerned Melissa and Barbara since teachers viewed infusing the best problems and tasks into whatever new curriculum is chosen (observation, April 30, 2015; M. Gordon, interview, May 1, 2015; P. Patton, interview, April 13, 2015) as critical to fully engaging students (K. Bishop, interview, May 1, 2015). In fact, ease of differentiation carried through the sixth grade team's recommendation to use CMP3 as its base curriculum, because teachers favored its use complemented by some seventh grade units and a bevy of CCSSM-aligned tasks from virtual and more traditional sources like the NCTM. In these instances, both student engagement and teacher agency figured into what could make CCSSM alignment problematic for these educators.

Although the group as a whole said they valued teacher agency in making instructional choices, one teacher repeatedly took up the issue vs. the CCSSM. For Phil, the new standards represented "clarity" in the form of guidelines, jumping off points for instructional decision-making, as he remarked, "there's a set of standards in my opinion and there are practices and an artisan takes those and thinks about how to interface that along with ... their students" (P. Patton, interview, April 13, 2015). Self-described as rooted in his years of classroom experience and teaching approach, Phil's stance set him bit apart from the sixth grade team. In fact, Phil described his greatest challenge in making the shift to CCSSM aligned instruction as "having my colleagues understand that this is a guideline and not the law. That this is you know something to go off of, it is a backbone of sorts.... It's not the end all be all" (P. Patton, interview, April 13, 2015). Later, in the middle of a conversation with the other teachers, facilitator and principal, Phil made clear his impatience with discussions that "nitpick" what

the Common Core calls for in relation to the learning opportunities that experiential projects offer. He maintained:

when you teach experientially, ...[with] a big project type of thing going, you're going to get into things that maybe may not be your standard but you've got to feel ok about kids having an opportunistic moment be able to investigate. You can't say 'I'm not going to talk about that because you're going to learn that in seventh'. (observation, June 15, 2015)

Here Phil argued for meeting students where they are rather than by what content standards specified by grade level. He felt developing students' future potential and ensuring curiosity about higher mathematics was of greater importance than coverage of a particular 6th grade standard. Even Melissa, the teacher who may have had the deepest knowledge of individual content standards, given the amount of questions she posed and specific references she made to them, asserted the group did a lot of lessons because "we love them" and "we think they're important" without being certain the CCSSM specifically called for them (observation, May 14, 2015). In addition to reflecting teachers' philosophies about practice and sense of efficacy respectively, these comments importantly highlight how points of divergence emerged despite concerted and faithfully intended implementation.

Finally, and not to get too far ahead in the argument, teachers' ability to differentiate instruction seemed an even larger force for divergence from the CCSSM because they believed access for all learners was foundational to good math teaching (focus group, December 18, 2014), taught unleveled, heterogeneous classes, and faced parent pressure to improve high school placement results. Simply put, the CCSSM's organization of grade-level standards (vs.

previous standards with multi-grade bands) added complexity to differentiating instruction for highest ability students by narrowing aligned content. Identifying these competing priorities suffices for now, as a subsequent section takes up teachers' discussions about differentiating instruction and aligning to CCSSM content in great detail.

In short, and notwithstanding the above points of divergence, members of the sixth grade math team devoted much time and attention to both the new content and practice standards over the observation period. Their opportunities to learn contained many references to the CCSSM that, in turn, underlay teachers' discussion about aligned curriculum materials, and stimulated them to reconcile how best to teach aligned content to reach all learners. Not only did this educator group view the CCSSM practices as reinforcing their teaching beliefs, but key communication vehicles like the SIP, Clark Principal evaluation, and report cards also measured student progress on specific CCSSM practice standards. Thus, as an organizational element, teachers' opportunities to learn were just one example of various supports for the CCSSM at the district, school and grade level, much like Kaufman and Stein (2010) outlined, with messages about the CCSSM seemingly "intense" and "pervasive," two attributes that favorably encourage teachers' responses to change (Coburn, 2004, p. 235).

In Contrast, Teachers Experienced the PARCC far more Divergently than Convergently

Although these educators understood the premise of the PARCC as measuring student progress in the eight practices and newly aligned content, they questioned the assessment's validity and regarded the time investment for administration as unreasonable. These latter two points echoed Fairfield Oaks' superintendent's January 2015 letter to the community about emerging concerns about the assessment. Moreover, teachers found that administering the

PARCC interfered with their teaching flow and subsumed two or more important weeks of learning for students. Importantly, the principal noted the disorganization of the state rollout, with important details like opt-out provisions left unspecified until the first day of test administration, did little to boost families or teachers' confidence in the assessment (K. Wise, interview, June 26, 2015). At the same time, all levels, from the Superintendent and other district administrators through to the Clark principal and individual teachers, were careful to comply with state mandates to administer the new assessment (C. James, PARCC and Growth Assessment Update to Board of Education, March 24, 2015; E. Hooper, interview, April 9, 2015; J. Monroe, interview, April 20, 2015; K. Wise, interview, June 26, 2015). So in response to leader messages, the math team complied with test administration and simultaneously worked to isolate their classroom instruction from most assessment effects.

More definitively, the sixth grade team including the principal commented on the PARCC's excessive time commitment (observations, January 15, 2015; February 11, 2015; E. Hooper, interview, April 9, 2015), "in a time of the year when you have the most happening. You have the most big school projects, big events, just culminating things just happen in the spring" (K. Wise, interview, June 26, 2015). Teachers perceived that administration of the test in March and May negatively impacted student learning (B. Jones, observation, March 19, 2015), student engagement (K. Bishop, observation, March 19, 2015), and teacher focus/flow (M. Gordon and P. Patton, observation, March 19, 2015; P. Patton, interview, April 13, 2015).

Specifically related to instruction, teachers referenced alignment to the PARCC test only once over the observation period, expressing uncertainty over the extent to which the test related to enacted curriculum (observation, February 9, 2015). This compared dramatically to the numerous questions asked and amount of attention paid to CCSSM alignment over the same time

period. During this same observation, facilitator Erin also pointed out areas in the PARCC practice test that these sixth grade teachers have not yet covered as a point of information, rather than direction to do so (observation, February 9, 2015). She later confirmed that the sixth grade curriculum was not PARCC aligned and that teachers were following district leaders' advice to "prepare kids for the [test] technology but not do test prep for the content" (E. Hooper, interview, April 9, 2015). To be fair, Erin said she understood the goal of using multi-step problems to test student learning in the PARCC and regarded the intent to assess the CCSSM practices as "a good thing, anything to get those things done, taught, and valued is good to me" (E. Hooper, interview, April 9, 2015).

Correspondingly, the least experienced and only non-tenured teacher in the group most clearly spoke about the "scientific need" for standardized assessment of student learning and her lack of anxiety over the tests because her students "know how to do this stuff" (K. Bishop, interview, May 1, 2015). Like Melissa, Kara believed if she continued to prepare her students well as deep problem solvers, exact content coverage vs. the PARCC would be less of an issue. She said there were things she could do to better align her teaching to the assessment, like looking over students' shoulders to see what the PARCC asked them to do or require more memorization of PARCC practice test items, but she chose not to do that. Kara summarized that "if you're a good teacher and you're teaching the kids how to problem solve and break things down and not just [answer] a, b, c, I think it's going to be just fine" (interview, May 1, 2015). Once more, this newest teacher articulated the most convergent view of the new assessment *and* professed not teaching to the test. Other educators largely commented on the PARCC's excessive time commitment and lack of actionable information to guide their teaching or student learning.

In terms of divergence, factors like district messages about the PARCC and the corresponding response of the broader school community supported teachers' de-emphasis of this standardized assessment. Both in observations and in interviews, educators described the magnitude of students' opting-out of the PARCC, the resultant time devoted to managing this process, and the buzz created by the district Superintendent's letter to the community. This January 2015 communication outlined concerns about the test's length, multi-screen format, loss of instructional time, "excessive rigor" and rushed logistics. The letter cited the shift from 23 states originally part of the PARCC test consortium to the less than ten that remained as evidence that district concerns were not isolated ones. At the same time, the Fairfield Oaks superintendent explained that the district would comply with test mandate. The Clark Middle School principal reiterated this message in a subsequent meeting of the sixth grade math team (K. Wise, observation, March 19, 2015). Teachers were to remain neutral about the test, and in interviews, admitted to doing so (E. Hooper, interview, April 9, 2015; J. Monroe, interview, April 20, 2015; P. Patton, interview, April 13, 2015). At the same time, District administrators held parent meetings and developed other communications (Fairfield Oaks Superintendent, personal communication, January 15, 2015) to educate the community about the assessment, including information about opt-out procedures. Overall, about a third of Fairfield Oaks' grades 3-8 students opted out of the March administration of the PARCC: the rate of refusal ranged from a low of less than 20% in fifth grade to a high of over 50% of grade 8 students' choosing not to take the test (C. James, PARCC and Growth Assessment Update to Board of Education, March 24, 2015). Interestingly, the closer the student was to matriculating to Belmont High School where another exam guided placement decisions, the more likely he or she was to opt out of the PARCC.

Roughly one quarter of Clark sixth graders did not take the initial PARCC exam, Jack described how the “buzz about the test shifted parent-student conferences in February, from discussions about student learning progress to asking questions about the upcoming test when he had very few answers to provide (J. Monroe, interview, April 20, 2015). He explained further that 10-12 out of his 22 students opted out of the test and outlined the lengths to which he had to go to ensure parents documented students’ refusal appropriately and oversee students in both testing and quiet reading environments. Additionally, Phil raised the notion of test score reliability with roughly half of his students opting out of the first PARCC test as well (P. Patton, interview, April 13, 2015; observation, May 7, 2015). Other teachers did not specifically raise concerns about opt-out rates or their influence on potential test score results at the classroom level, but each spoke to the level of disruption their students experience in this standardized assessment environment, as “the more time we spend testing, the less time we spend teaching” (K. Bishop, interview, May 1, 2015), and by extension, students were learning.

In interviews, some teachers moved beyond uncertainty about test coverage (M. Gordon, interview, May 1, 2015; J. Monroe, interview, April 20, 2015; P. Patton, interview, April 13, 2015) to their mistrust over what information the PARCC test would yield about student learning (P. Patton, interview, April 13, 2015) and what form the PARCC score report would take as well as potential parent misinterpretation that could result (M. Gordon, interview, May 1, 2015). Barbara shared concerns about test validity, admitting she “isn’t sure what the PARCC is testing, but “it’s not assessing the standards” because of the way the questions are written (B. Jones, interview, May 6, 2015). She took the practice exam and felt because of the wordiness of the questions, students “can’t even get to the math, to what the standard is supposed to question,” a view that echoed Erin’s assertion about PARCC practice test items “not making sense” and being

“confusing” (E. Hooper, interview, April 9, 2015). Erin also wondered out loud about test validity. She did not believe the PARCC performance assessment addressed the CCSSM practices as intended, as it was “supposed to be about critiquing the work of others, modeling with mathematics and all that, but I didn’t see it” in the practice test (interview, April 9, 2015).

Although uncertainty about the intent and actual implementation of the CCSSM seemed to motivate teachers’ interrogation of and reflection on practice, that was not the case for the PARCC. This same group of teachers seemingly accepted the PARCC’s shortcomings at face value, spending no time considering or reconciling other views during observations.

Unsurprisingly, even when probed, none of the teachers expected implementation of the PARCC to change what good math teachers do. Barbara said she “doesn’t feel the pressure of PARCC” (B. Jones, interview, May 6, 2015) although she understood how teachers in other districts might. Extending this latter point, Erin feared that the assessment could ruin the promise of standards aligned instruction that emphasize the practices because in many other districts there will be just too much pressure to teach to the test and maximize scores. Within an even larger context, Erin found pressures to maximize PARCC scores both reflected “our country’s obsession with accountability ...[and the idea] that it can be done with one standardized test score” (E. Hooper, interview, April 9, 2015). Once again, Erin like Barbara clarified remarks about test pressures as pertaining to public school teachers in general, working in districts outside of Fairfield Oaks.

Despite teachers’ negative views about the PARCC, observed teachers actually talked about the role of assessment quite frequently (21 times in observations through June with roughly equal mentions in interviews). Regarding curriculum-based assessments, comments ranged from the balance of summative and formative assessments being given (observation,

February 9, 2015) to teachers' practice of attaching scoring rubrics as an important feedback mechanism for students and parents (observation, February 11, 2015) as well as the many ways in which teachers rely on informal formative assessment information (J, Monroe, interview, April 20, 2015). Again the degree to which these teachers described attending to classroom-based assessments as compared to the paucity of reflection about the PARCC seemed consistent with the district's low reliance on standardized test information.

In closing, throughout the observation period, teachers remained annoyed by how the PARCC disrupted student learning and took time away from their teaching. Although all educators said they understood the intended relationship between the PARCC and CCSSM aligned instruction, they remain unconvinced of any benefit as implemented. Both collective and individual conversations indicated they saw greater value in diagnostic measures that could guide future instruction or student learning than a single standardized score received after students have moved on from their classes. Cognizant of local values for standardized testing in general and clear administrative sensegiving about the PARCC in particular, these educators distinguished their experience with the new assessment policy from that of teachers in other districts. Thus, this set of binary views underscored the importance of local factors on teachers' convergence experience and how they perceived practice implications or not.

Teachers Decoupled Future Professional Evaluation Change from Instructional Shifts Underway

Observed teachers also viewed impending changes to professional evaluation criteria as separate from curricular decisions they already faced from Common Core alignment, topic coherence, or depth of coverage. Of the three policy signals, professional evaluation was the

least mentioned and a subject about which teachers seemed to have the least definitive information. Put another way, teachers expressed far more opinions about evaluation policy (26) in interviews than commented on general changes in evaluation criteria (14) or more specific elements such as new observational frameworks (10) or inclusion of student growth measures (7). More to the point, these teachers had experience responding to the CCSSM and the imposition of more PARCC testing time, while they saw evaluation changes in compliance with PERA as taking place in the future, to be determined by joint Board member-teacher representative committee in 2015-16. Finally, both the teachers and principal shared the belief that PARCC results would not figure into future evaluations, and thereby dismissed the convergence policymakers intended when linking aligned instruction with accountability measures as shown in this study's theoretical model.

As briefly mentioned, teachers regarded future evaluation criteria requiring measures of student growth as “unknowns,” to borrow Melissa’s characterization, both out of immediate control and unworthy of expending too much mental energy (P. Patton, interview, April 13, 2015). Following a district-wide professional development session on the subject, Erin, Melissa, and Kara shared some details about the process by which Fairfield Oaks would determine which types of assessments would be used. They expected a joint Board-teacher committee to address outstanding issues related to PERA, namely which assessment types would be incorporated into Fairfield Oaks’ evaluation plan for 2016-17. However, these same educators said that while it was important to understand the outcome of this work related to PERA implementation as it affected their “livelihood” (M. Gordon, interview, May 1, 2015), they did not feel as connected to it as other current demands in their professional life that relate to instruction.

Although none of the observed teachers seemed very clear on what to expect from the new evaluation criteria, only facilitator Erin expressed a negative opinion about the coming changes. When interviewed, Erin said her only experience with new evaluation criteria was second-hand, via the Clark Middle School principal's evaluation. According to Erin, the principal's final rating was partially derived from a mid-year measurement of growth of students' use of practices (see Appendix F for matrix previously described and incorporated into district SIPs and report cards). Since students often exhibit the most growth in the Spring measurement, Erin saw the conflict between the mandated timing of the evaluation cycle and availability of student data as unreasonable: she felt mid-year of measurement student growth likely impacted an administrator's ability to attain the highest rating (E. Hooper, interview, April 9, 2015).

Later Erin pulled the policy thread from good math teaching to the PARCC and through to evaluation. Erin described teachers' pressure to turn toward traditional teaching to maximize scores is "...such the unfortunate thing about the PARCC. Any standardized test that is attached to something like the standards in a way is going to ruin it, especially if it's attached to teacher evaluation" (E. Hooper, interview, April 9, 2015). Once more, Erin spoke generally of her impressions about how *other* public school teachers may react to implementation of new evaluation criteria by teaching to the test, this time for the sake of their own evaluations.

Related to implementation of new evaluation policy in their own district, a couple teachers commented on the district's intent to work closely with teachers to develop the new criteria, implying trust in that process. Kara found that "Fairfield Oaks is really trying to be thoughtful and to problem-solve the kind of assessment that's going to allow teachers to put their best foot forward.... Fairfield Oaks is very different in their approach. Teachers have a lot of

power, which I think is good” (K. Bishop, interview, May 1, 2015). Moreover, her subsequent admission, “it’s not like I’ve read the law or anything,” stood in stark contrast to how often teachers referred to and looked up individual Common Core standards in collective discussions over the observation period (interview, May 1, 2015). And the way in which Fairfield Oaks leaders conveyed messages about evaluation seemed to figure into teacher dispositions toward future evaluation changes. Melissa spoke to this source of sensegiving directly, seeing district messages about future evaluation criteria as “calming,” intended “not to scare,” and appropriately conveyed in tri-annual district-wide professional development meetings (M. Gordon, interview, May 1, 2015), which the Clark principal confirmed (K. Wise, interview, June 26, 2015).

Although teachers concretely described policymakers’ intended relationship among the standards, new aligned assessments, and future inclusion of student growth measures in their own evaluations, none expected future evaluation criteria to change how they teach mathematics (K. Bishop, interview, May 1, 2015; M. Gordon, interview, May 2, 2015; E. Hooper, interview, April 9, 2015; B. Jones, interview, May 6, 2015; J. Monroe, interview, April 20, 2015; P. Patton, interview, April 13, 2015). Phil went so far as to say that “as long as you’re doing what you feel is really just premium education, I think all that stuff will handle itself and ah the fact of the matter is, it’s [evaluation criteria] really out of your control.” He closed his response with “good teaching is good teaching” (P. Patton, interview, April 2013). This teacher also said he was not personally concerned about the new evaluation criteria although he did raise issues about the reliability of PARCC scores given the district’s high opt-out rate. Barbara stated explicitly that “she is going to hold true [to a self-generated list of best practices that] allow children to explore concepts, pushes their thinking, and withholds the right answer, makes mistakes part of the

learning experience, and creates a safe environment where they're not afraid to share their thinking or questions" even if her "evaluation were to get knocked down for some," because they represent "core values" for her (B. Jones, interview, May 6, 2015). Although Barbara expressed this belief more directly than the other teachers, all said they do not foresee abandoning what they consider to be principles of good math teaching once the district implements the new evaluation criteria.

An important shared belief helped explain why this group expected to maintain their own practice ideals in the face of the yet to be finalized evaluation criteria. *Consistent with leader direction over time, the Clark team believed PARCC test results would not figure into the district's new evaluation plan.* First, in interviews six months before observations began, the Fairfield Oaks' Superintendent and Director of Curriculum mentioned that future evaluations may not necessarily involve PARCC results, that they would look toward teacher developed assessments of what was actually taught in classrooms or some other measure to serve as the student growth piece in teachers' evaluations (personal communication with Superintendent, May 7, 2014; C. James, field notes, May 21, 2014). During a subsequent meeting, the Clark Middle School Principal outlined the need to administer the final round of testing to measure student growth to ensure a three-year normed trend necessary for use as an alternative measure of student growth to replace the PARCC in evaluations (observation, March 19, 2015). A couple of months later, this principal confirmed that teachers would be hearing much more about impending evaluation changes in the 2015-16 school year as the PERA committee worked through binding decisions like which assessments may be used (K. Wise, interview, June 26, 2015). At that time, she again acknowledged PARCC as a reporting requirement of Clark as a public school but in terms of professional evaluation she noted, "if student growth is going to be

30% and the other seventy is your observation, I think we're going to be ok. They've changed the law, they could change it again, so we can use our own created assessments which is good because it's more aligned with what we value. So in that way, I don't worry about it as much" (underline added for speaker emphasis). Given existing PERA provisions, the principal seemed to have every reason to believe that inclusion of PARCC results remained an option but not a requirement of future teacher evaluations.

Beyond these comments from the principal, two teachers interpreted what evaluation might hold for them in the near term. Melissa did not "know if the PARCC can account for anything because of the timing" required for teacher evaluation, a question she said she posed to one of the representatives on the PERA committee (M. Gordon, interview, May 1, 2015). In addition to the practical logistics of including PARCC results arriving in August or later for evaluations finalized months earlier, Jack pointed to his experience administering the test and his lack of control over whether students take this test seriously or which students elect to take the test from all those assigned to his classroom. He also expressed his "...hope is to be able to develop our own ways to monitor their growth and use that as a measurement tool and use that as, for our evaluation rather than use something like a PARCC" (J. Monroe, interview, April 20, 2015). Once again, Jack's sentiments about the use of locally developed growth assessments resonated with district administrator messages and expressed values about teacher agency.

In conclusion, this group of teachers felt less connected to impending evaluation changes than the implementation of CCSSM or the PARCC already underway. Although uncertainty prevailed about which assessments will factor into their professional evaluations, teachers seemed to trust the decision-making process underway and did not foresee changing how they teach mathematics in response to the new evaluation criteria. Moreover, teachers and district

administrators shared a belief that the PARCC would not be a factor in future evaluations, which de facto decoupled the policymakers' designed link between standards-based instruction and aligned accountability measures. All of these elements helped the teachers compartmentalize possible future evaluation effects from their ongoing efforts to provide high quality instruction.

Observed Opportunities to Learn Reflected the Study's Theoretical Framework.

The previous three sections demonstrate how topics raised in collective conversation can evidence points of policy convergence and divergence for these teachers. Now attention moves from the left hand side to the middle of the theoretical model to describe the component parts of teachers' opportunities to learn. Observations indicated that the process by which this team of educators identified and made sense of practice dilemmas in interactions with one another mapped rather neatly onto the theoretical model incorporating Stein and Coburn's (2008) "architecture of learning" and Kaufman and Stein's (2010) findings about informal opportunities to learn. Observing teachers in a variety of informal learning situations with various participation structures, task goals, and participant resources evident, lent some perspective on their experiences as learners in this specific environment. Accordingly, this section begins by identifying consistent common planning time as a critical resource for the sixth grade team's opportunities to learn, and then addresses other key components as a framework by which to analyze how participants engaged in sensemaking about key practice dilemmas.

Opportunities to Learn Were Resource Rich, Starting with Consistent Time Together

Over the past six or seven years, this team has enjoyed two periods of daily common planning time, which Horn and Kane (2015) regarded as "a considerable investment, monetarily and organizationally" (p. 10). Providing some context for this investment in collective teacher

learning and planning, the Curriculum Director noted the weekly meetings helped create shared purpose, that “...shifts the focus to practice and to students rather than the ‘me’ of teachers.... Work is now ours and that shifts the conversation, but it was a hard shift and a long process to get everyone working on the same things and tough on leadership.” In terms of competency and confidence of these sixth grade math teachers, she continued,

now there is a spirit of sharing. Math conversations happen all the time and all over the place – e.g., can you show me what you did with your iPad exercise? This lifts everyone’s instruction and their confidence and curiosity is contagious. The learning process self-perpetuates and sustains change, especially with the facilitators and great learning power from other teachers. (C. James field notes, May 21, 2014)

Given this administrator’s view, Clark Middle School’s commitment of organizational time for ongoing, informal teacher learning seemed a foundational resource for sixth grade teachers to implement policy actions like CCSSM aligned instruction. Teachers also commented on how both regular time and physical proximity facilitated the sharing of ideas, questions, and experiences (focus group, December 18, 2014). They vouched for the frequency and informality of teacher interactions about mathematics (focus group, December 18, 2014; observation, June 15, 2015; M. Gordon, interview, May 1, 2015; P. Patton, interview, April 13, 2015) and all of them commented on the benefit of weekly team conversations on developing their practice. This group of educators found interactions in opportunities to learn were frequent, animated, and often full of contrasting views and opinions (focus group, December 18, 2014; observation, June 15, 2015).

In truth, although weekly team meetings and other gatherings of teachers during their daily common planning time could be occasions of sensemaking, observed attempts to resolve expressed practice dilemmas were rare vs. time spent sharing opinions about practice elements or coordinating materials, dates, and the like. This balance of talk seemed in line with Coburn's (2001) intensive case study that found a majority of teachers' collective conversations concerned iterative discussion of "technical and practical" details (p.145): quick interrupted exchanges about logistics like how many groups, what kind of materials, coverage of which problems, or the timing of a unit assessment. Individual Clark teachers reported that exchanges of this type also occurred in frequent, often daily interactions during their planned periods and/or over lunch (observation, June 15, 2015; K. Bishop, interview, May 1, 2015; M. Gordon, interview, May 1, 2015; E. Hooper, interview, April 9, 2015; J. Monroe, interview, April 20, 2015; P. Patton, interview, April 13, 2015).

However, at times within weekly meetings of the entire team, teachers described both positive and negative classroom experiences or asked others about theirs. These exchanges seemed to exemplify what Horn and Kane (2015) termed "sharing ideas" about practice: a type of interaction less complex than problem solving about practice, perhaps involving storytelling about elements of practice or students, but lacking specific epistemic claims about mathematics and pedagogical values, or prompts for elaboration (Horn, 2010). Furthermore, Horn and Little's (2010) distinction between *showing or telling* and *inviting deliberation* may be a useful shorthand to grasp the difference between sharing ideas and sensemaking about practice discussed in the next sections.

On the other hand, a few weekly meetings and summer curriculum work sessions included instances of longer and more involved discussion. For example, the overarching goal of

the summer work session was to revise the sixth grade curricular scope and sequence based on classroom experiences this past school year, the choice of new materials, and teachers' collective knowledge of available supplemental resources (C. James, 6-8 Math Materials Selection to Board of Education, May 19, 2015). They set out to address certain unresolved questions discussed during previous weekly meetings (observations, April 30, 2015; May 7, 2015; May 14, 2015), such as which seventh grade units should they incorporate and what ordering of topics (e.g., geometry first) and duration might best ensure coverage of all CCSSM standards, including statistics, next year (observation, June 15, 2015; E. Hooper, 6th Gr Math Meeting Notes 2014-15, June 15, 2015). The sixth grade team also explored multiple options to balance how they establish strong number sense for students and engage them in more abstract and involving experiential work. What seemed telling about these longer conversations is that teachers seemed to justify their practice choices by more readily calling on student thinking or specific CCSSM practices than in the more time-constrained weekly meetings.

Finally, through a combination of shorter and longer collective conversations, observed teachers seemed to generate enough practice sense to keep moving their instruction ahead practically and more strategically while incorporating new curriculum materials, tasks, tools, and student assessments simultaneously. Topics arose in opportunities to learn, whether planned or impromptu, related in part to the task goal of the interaction, the amount of available time, and the composition of the group present. The greater amount of time spent together, the more likely a planned agenda guided discussion among most or all of the sixth grade team. That agenda, however, did not preclude tangential asides, moments of humor, or storytelling as these teachers conversed. In addition to the time allotted and task goal, the composition of participants and

experiences, knowledge, or positional authority they brought affected participation structure of mathematically focused conversations. These last elements are taken up next.

Other Resources, Boundary Objects and Participation Structure Shaped Opportunities to Learn

Even with long-standing meeting routines characterized by open discussion of varied opinions (focus group, December 18, 2014; E. Hooper, interview, April 9, 2015) and expressions of uncertainty, teachers' opportunities to learn differed in ways other than the time allotted for discussion. For opportunities to learn resulted from a dynamic constellation of factors and actors interacting with one another, as noted by Stein and Coburn (2008). Whether team meetings involved CCSSM aligned mathematics problems they worked on together (observations, January 15, 2015; February 9, 2015), balancing the fidelity of a curriculum pilot with the desire to challenge all students with differentiated instruction (observations, January 15, 2015; February 9, 2015; March 19, 2015), or contemplating the loss of teacher agency with greater reliance on integrated published curriculum materials (focus group, December 18, 2014; observation, February 9, 2015), teachers routinely referred to boundary items and relied upon their own and others' knowledge or experience in conversations related to mathematics (observations, April 30, 2015; May 7, 2015). Furthermore, participation structure varied by type of opportunity to learn, whether observing/debriefing a consultant lesson, coordinating pilot materials, or participating in a weekly meeting of the whole team.

The following discussion thus takes up the teachers' use of boundary items and other resources before addressing how participation structure seemed to vary by type of observation. To begin, use of boundary items sometimes helped focus discussion, illustrate a point, or make

an abstract concept more concrete. For example, in terms of physical boundary items, members of the group repeatedly referenced Common Core content (62) and practice standards (15), curriculum materials (72), and virtual resources like the Illustrative Mathematics website, NCTM monthly newsletters, and visualpatterns.org over the observation period. In addition, educators referenced insights from scholars Jo Boaler or Cognitively Guided Instruction (Carpenter, Fennema, Franke, Levi, & Empson, 1999), attributions that underscored the wealth of material and knowledge resources these teachers brought to their discussions about mathematical practice.

Relatedly, facilitator Erin served as another resource that significantly advanced the sixth grade team's opportunities to learn. The Clark principal echoed Horn and Kane's (2015) conclusion about the criticality of adept facilitation for learning in community when noting how this group greatly benefitted from Erin's leadership and coaching support as a dedicated facilitator (K. Wise, interview, June 26, 2015). In addition to organizing the team meeting agendas and documentation such as grade level agreements, common assessments, or compilation of math tasks, Erin easily drew on a wealth of middle school math teaching experience in Fairfield Oaks and a strong professional network in the national mathematics arena (E. Hooper, interview, April 9, 2015). District administrators said they admired her knowledge of mathematics and often relied on her to convey important direction to the sixth grade team and others (C. James, field notes, May 21, 2014; K. Wise, interview, June 26, 2015). In addition, Erin presented with teachers at NCTM conferences as well as served as a consultant to the Illustrative Mathematics website, engaging teachers in testing tasks or reviewing emerging content related to the CCSSM. Teachers like Barbara noted how Erin's introduction and exposure to conference speakers enriched her worldview about mathematics (B. Jones, interview, May 6, 2015) and Jack placed her at the center of the two best learning experiences he has had as an educator (J.

Monroe, interview, April 20, 2015). Thus, Erin's role as a dedicated facilitator, her knowledge of middle school mathematics in and outside the district, as well as the way in which she engaged with these sixth grade teachers all contributed to her effectiveness as a leader and an instrumental resource in teachers' many opportunities to learn (Penuel et al, 2009).

Besides Erin's role in structuring and directing many of the observed opportunities to learn, close attention must be paid to members' interaction with one another. It is insufficient to point out that observed collective interactions among teachers seemed animated and generally involved many questions, rotating speakers, different points of view as well as some amount of leader direction, as the balance of these elements was not uniform over the study period. In fact, participation structure seemed to vary with the different types of learning opportunities these teachers experienced.

To elaborate, over the observation period, teachers participated in several different types of learning opportunities during their common planning time – coordinating ongoing pilots of curriculum materials, constructing a common assessment, learning about and watching an in-class demonstration lesson involving supplemental materials, comparing strategies to solve a real life mathematics problem, and debriefing implementation of a technology-based intervention for struggling students. In addition, they discussed their experiences co-teaching with the mathematics facilitator, attended publishers' training on new materials, and interrogated practice choices that best addressed high ability learners. The following several examples thus highlight observed relationships between the type of learning opportunity and participation structure among the sixth grade team.

The first example concerned the most prevalent observation, the weekly team meeting. As mentioned above, Erin typically organized the agenda for those meetings, managed them (e.g., topic coverage, time spent on topic), and summarized discussion outcomes (6th Gr Math Meeting Notes 2014-15). In these meetings sometimes attended by the school principal, the agenda periodically included a math problem (often referred to as “play”) that the teachers worked on together as well as other topics of interest to the sixth grade team like implementation of a math intervention, planning for parent conferences, or coordinating topic coverage such as geometric shapes (observation, May 14, 2015). An easy sharing of opinions, views, and experiences characterized these interactions, often prompted by the facilitator’s use of open-ended questions and general practice of asking for other opinions within the group. Erin began one meeting about teachers’ concerns about a new math intervention for struggling students by asking for everyone to brainstorm “...and put everything on the table,” so they could move ahead with implementation (observation, January 15, 2015). Another time, she began the weekly meeting by sharing a problem the school custodian asked her help in solving before building an octagonal structure to scale. Erin gave the teachers the details, and then asked, “what would you do to solve this? I am curious...” (observation, February 5, 2015). They spent the next 8 ½ minutes comparing individual problem solving strategies as well as discussing the need for precision and accuracy, activity very much in keeping with a couple of the CCSSM practice standards.

Secondly, and in contrast, when groups of teachers met specifically to plan for instruction or assessment during ongoing curriculum pilots, facilitator Erin adopted more of a resource role as teachers discussed topics for resolution largely among themselves. When Melissa, Kara, and Barbara met to discuss their curriculum pilot experiences in their classrooms, one of them

brought forward the task goal, whether coordinating activities or deciding how best to assess a lesson, and then they talked back and forth among themselves (observations, February 9, 2015; February 11, 2015). In particular, teachers' use of physical boundary items was more obvious in these sessions than in most other meeting observations. The educators present naturally made many references to materials being piloted. They thumbed through their teachers' guide, read aloud from it, reviewed an upcoming assessment, and pointed to different student exercises. They also consulted virtual resources as they talked, looking up both the CMP3 and the Illustrative Mathematics websites for explanations about CCSSM content strands and teaching resources, as well as a team specific Google doc of tasks managed by Erin. In these hands-on meetings, their observed pattern of interaction seemed to mirror the CCSSM practices of using appropriate tools, promoting student-to-student discussion, and constructing arguments/critiquing the reasoning of others rather than a more traditional IRE (initiate-respond-evaluate) pattern that often flows from a teacher "in front of the room" (Mehan, 1979).

At the same time, when an external consultant met with the team over the course of a morning to preview, demonstrate teaching, and debrief the use of a supplemental lesson on the use of double number lines, the conversation did adopt the more traditional IRE pattern, in which the consultant directed the conversations and asked questions of the teachers and math facilitator who assumed the typical student role (observation, January 15, 2015). In this third instance, teachers also asked questions of the consultant rather than one another, except for when he directed them to work in pairs on student problems. Interestingly, this pattern of behavior not only ran counter to how these teachers usually interacted with one another, but directly contradicted how the consultant and teachers viewed the objective of the demonstration lesson: to facilitate student led discussion and problem-solving per the CCSSM practices. This seemed

another point of divergence within the team's obvious efforts to engage in learning activities that would help bolster their teaching and modeling of the mathematical practices.

The fourth and final example pertained to the longer summer work session revolving around planned questions by the principal and facilitator as well topics raised by the teachers in earlier weekly meetings. The principal's and facilitator's co-leadership of the summer session ensured not only the coverage of agreed upon agenda items, but the continued probing of teachers on an individual basis. Similar to observed weekly planning meetings, the facilitator prepared the agenda, managed the time, and summarized the group's progress, agreements, or questions. However, the principal again took an active role, as in an earlier meeting, she challenged teachers' understanding and encouraged them to share their thinking about more tacit beliefs or practice decisions. Her moves echoed Coburn's (2005) findings about the importance of leader participation in learning about instruction. In this case, the principal's stated intention was to take on the tougher instructional questions or relay district-level direction so that the facilitator could serve as a trusted instructional coach to these teachers (K. Wise, interview, June 26, 2015). Kathy believed this would allow Erin and the teachers to work together more seamlessly on improving classroom practice and minimize concern they might have about facilitator's acting in a quasi-administrative capacity. Therefore, Kathy's presence, intention, and observed probing of teachers also notably influenced participation structure: teachers responded with more formal turn taking and found themselves reminded to answer the principal's pressing question (observations, March 19, 2015; June 15, 2015).

In conclusion and by way of the previous examples, facilitation as a resource, use of boundary items, interaction patterns, and composition of participants showed some commonalities over observed opportunities to learn and some differences across types of

learning situations. These select examples indicated a fluidity as to how these teachers' meeting time was managed, participation solicited, and topics adapted to work through particular questions about practice. What's more, they demonstrated how Stein and Coburn's (2008) "architecture of learning" components, which make up the middle section of this study's theoretical model, aided analysis of similarities and dissimilarities across multiple group interactions.

With groundwork laid on how these educators experienced policy convergence and divergence as well as used various opportunities to learn about mathematics instruction, discussion now transitions to practice dilemmas most evident in their professional discourse.

Key Practice Dilemmas in Opportunities to Learn Stemmed from Policy Convergence, Local Factors

Teachers' policy convergence experiences and the nature of their informal learning opportunities helped shape how they wrestled with various practice dilemmas and to what end. Defined for my analysis as "competing demands or influences on practice that create indecision, challenge existing beliefs, and cause educators to question their professional response," only some dilemmas related directly to the policy convergence environment under study. Other articulated practice dilemmas seemed indirectly or unrelated to the three policy signals. Finally, given how Clark sixth grade teachers decoupled implementation of the CCSSM with the other accountability policies, it was unsurprising that observed practice dilemmas largely departed from potential practice issues outlined in Chapter 2.

As a frame of reference, practice dilemma was the most prevalent code (76) within the data set as a whole, followed closely by curriculum materials (74). Overall, teachers raised

practice dilemmas related to the policies under study (43 or 57% of total mentions) somewhat more often than other issues (33 or 43% of total mentions). Of course, not every mention of a practice dilemma was unique as teachers sometimes built on one another's concerns and some dilemmas arose in multiple conversations over the observation period. That said, three general themes emerged from categorization of dilemmas, as indicated below:

Table IV *Practice Dilemma Themes Across The Dataset*

CCSSM Alignment (30)	Good Math Teaching (28)	Teacher Agency (13)	Other (5)
High ability learners (14)	Mastery vs. test scores (5)	Standardized materials (11)	Special Education intervention (3)
General content (4)	PARCC time (4)	Student coherency (2)	Role of assessment (2)
Statistics as topic (3)	General assessment (3)		
Teacher inexperience (3)	Parent pressure (3)		
Other topic order (2)	Teacher inexperience (2)		
General assessment (2)	Homework (2)		
Practices (2)			

This table identifies dilemmas mentioned at least twice over the observation period. As a point of reference, slightly more than half of the articulated dilemmas occurred in collective professional conversations (42), with the remainder (34) surfaced in individual interviews.

At first glance, the sheer number of practice dilemma mentions might indicate the ease with which these teachers shared ideas and questions about mathematical instruction in general or the degree to which they worked to become surer of their practice. In order to gauge whether

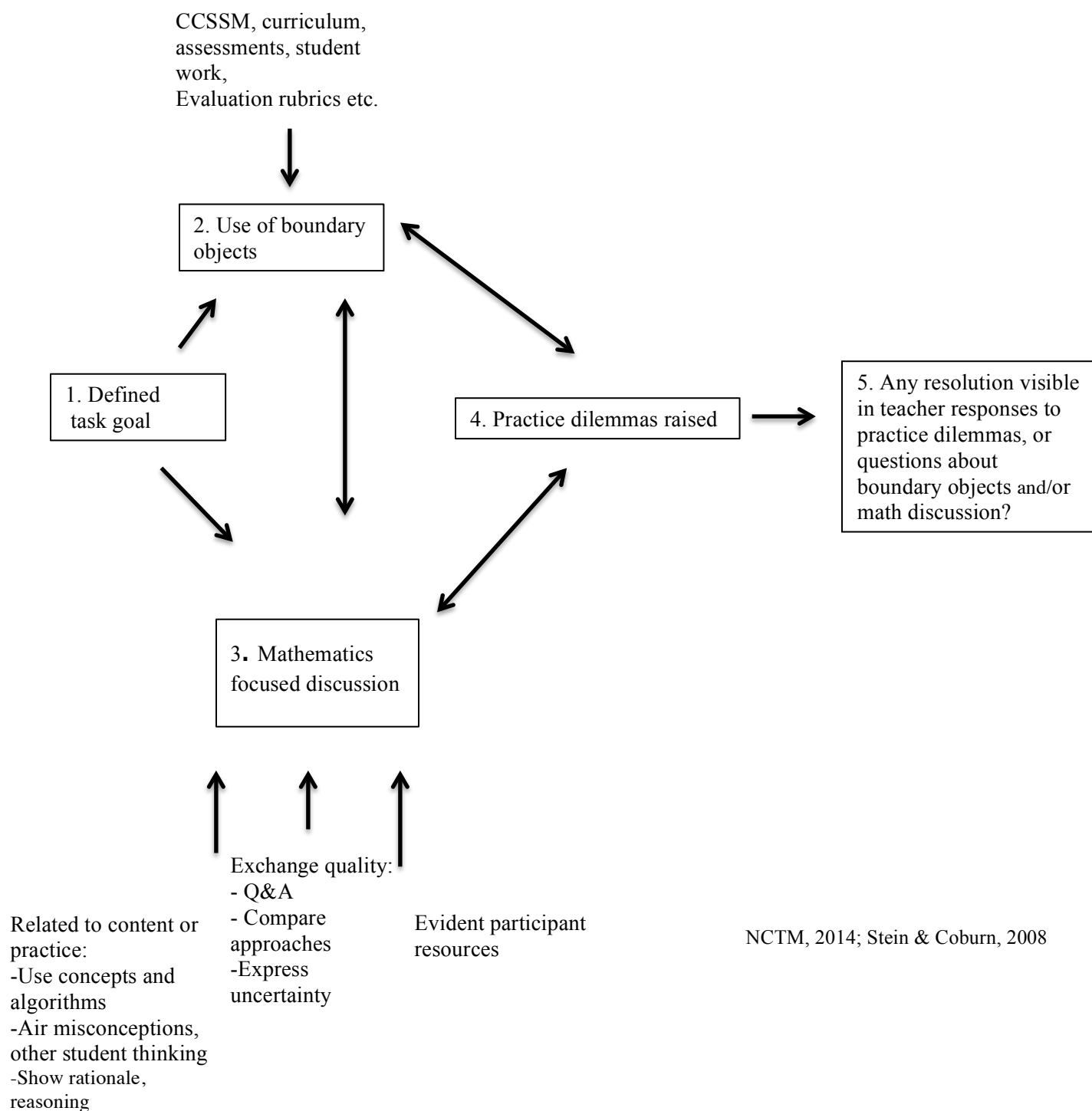
the overall balance of mentions seemed consistent with the early implementation of multiple policies for this team, attention needs to turn to different ways of grouping the individual dilemmas. Sheer numbers of mentions seems to indicate the relative importance of teachers' observed tensions between CCSSM content standards and differentiating instruction for high ability learners; between teaching for content mastery and optimizing student test scores; and between newly aligned curriculum materials and teachers' desire to supplement widely and/or create their own tasks. Yet another way of categorizing dilemmas arising in opportunities to learn was by policy signal. Given that teachers mentioned the CCSSM content and/or practice standards in every observation and were engaged in an aligned curriculum materials pilot during the period, not surprisingly dilemmas related to the CCSSM (22) far outpaced any other type. Whether directly involving content (12) or practice (4) standards or by extension, curriculum coverage or sequence (6), dilemmas stemming from the CCSSM predominated in both absolute quantity and duration of interaction over those originating from the PARCC time requirements (2) or new evaluation criteria (0). Truth be told, more dilemmas arose in collective professional conversation due to the general role of assessment (4) than from how the PARCC interrupts teaching flow and/or compresses curriculum coverage. This skew aligned with these teachers' acceptance of the PARCC's time constraints as a given and an element to be managed around, rather than a point of interrogation. Interview data showed the same trend of mentions and skew toward CCSSM related dilemmas.

Teachers also mentioned 19 other dilemmas not overtly linked to the policies under study in collective conversations: examples included the trend toward diminished teacher agency in practice decisions about what and how to teach students (observation, March 19, 2015), the role of homework (observation, May 14, 2015), and what facilitates student retention of material

(observation, April 30, 2015). Finally, even when probed in individual interviews, teachers did not foresee practice dilemmas arising from new evaluation criteria including measures of student growth in 2016-17.

However, as alluded to above, two areas of concern recurred amid teachers' consistent attention to alignment and coherence in instruction. The first involved reconciling the more explicit grade level expectations set forth by the CCSSM with teachers' desire to challenge high ability students through differentiated instruction. This dilemma came up three times in collective conversations and reflected CCSSM policy changes interacting with Fairfield Oaks' high value on differentiated instruction. A second major practice dilemma that arose twice for extended periods related to the stated ideal of teaching content for mastery rather than test coverage. Seemingly more rooted in educators' experience and beliefs about good math teaching than from the policy signals under study, this second dilemma demonstrated teachers' concurrent concerns with problems of practice that did not originate from the policies under study. Both dilemmas were similar in that over time, teachers' talk evidenced interactions among boundary items, various participant resources, and conversational elements such as expressing uncertainty, refocusing the task/goal, asking questions, and offering alternative interpretations to problems of mathematics practice, as again depicted below:

Figure 2. Conversational representation of sensemaking about mathematical practice



Relying on the above elements and interaction flow as a guide, discussion follows about these two dilemmas to illustrate the process by which these teachers seemed to make sense about two problems of practice. The description of each dilemma closes with observable sense made by this group of educators, as represented by the farthest right section of the theoretical model.

Dilemma 1: Balancing differentiation for high ability learners with grade level alignment of the CCCSM. As mentioned previously, this group of teachers regarded differentiation as a prized element of instruction as did the Fairfield Oak district as a whole (Differentiation in Fairfield Oaks to Board of Education, November 17, 2010). For example, most teachers alluded to aspects of differentiation in their definition of good math teaching attributes at the outset of observations. Kara said then that a good math teacher “provides rich problems and tasks that have entry points for a variety of learners and elicit a myriad of strategies” and Jack noted they “challenge students at their level, look for ways to engage all learners” (focus group, December 18, 2014). Melissa found it was important to “create opportunities for all students to learn and grow [utilizing] low floor, high ceiling tasks” and then added “a good math teacher instills a love for math in her students really by creating opportunities for students to learn and grow by introducing things with those low floor high ceiling task ah entry points so that there’s that opportunity for differentiation that everyone feels like they can access...” (focus group, December 18, 2014). In addition, these initial comments seemed in line with the district’s five-year plan to develop teacher proficiency according to well-articulated differentiation framework based on Tomlinson (2013).

Moreover, over the observation period, several teachers, but most especially Melissa, questioned how to balance reaching high ability learners, and at the same time, respect grade-level content standards found in the CCSSM. In an early observation, Erin mentioned that in the

past, before aligning to the CCSSM, the sixth grade team routinely used 7th grade texts and tasks in their instruction (observation, January 15, 2015). In a subsequent meeting, Jack remembered how they used to have “half the kids doing 6th grade CMP and the other half doing 7th grade based on aptitude but now following the Common Core they now do 6th grade content only ...” and Erin responded that

we used both books (sixth and seventh) and that was easy because they (seventh grade) didn’t do that...they used traditional books. We could do whatever we wanted and we beefed up our curriculum and then the Common Core came....some of that sixth grade content is too easy for some of our kids. (observation, March 19, 2015)

Both agreeing with Jack’s statement about prior use of seventh grade materials and clarifying how strict adherence to specific grade level content may be the prevailing mindset for CCSSM alignment, Erin maintained the latter approach alone would not challenge some Clark sixth grade learners. Nonetheless, Erin did not suggest an alternative way to implement the standards and reach all learners. So no real sense was made of this content related dilemma at this point.

Yet, in another weekly meeting, teachers offered several ways of differentiating instruction that did not necessarily involve different content. As background, while planning with Barbara, Kara, and Erin, Melissa complained that in her desire to be true to the curriculum materials pilot, she refrained from offering supplemental problems or tasks, as was her usual practice. Two high ability students then indicated they were bored which she blamed on her “one size fits all” teaching approach during the pilot. Again, Melissa expressed her uncertainty and in response, Barbara and Kara first challenged Melissa to teach the way she usually did using the pilot materials. In addition, facilitator Erin then reinforced the idea that “it is always the teacher’s

responsibility to challenge the [students]” (observation, February 9, 2015). Finally, Barbara reminded Melissa that she could go deeper with her questions for those students and offer them extended problems as needed. Here the other educators offered different alternatives to Melissa’s instructional predicament, but the conversation remained at the level of general instruction. Then the conversation shifted and teachers spoke at length about various problems with which students were struggling and how to address those misconceptions. Nevertheless, the matter of differentiating math instruction did not end there.

A few weeks later, Melissa re-focused her concern about being authentic to the pilot materials and engaging high ability students to meet their specific learning needs. She then said to the group:

as a teacher I don’t know if I have a clear understanding really what is expected of me in terms of supporting the kids. I think I do in terms of supporting struggling students but I definitely don’t for my kids that qualify for [accelerated] high school math. (observation, March 19, 2015)

Next Melissa connected mastery of a specific math concept, the CCSSM grade level strands, and highest ability students:

I still struggle at what point are we digging for more depth but then at sixth grade we know that once you understand fraction operations there really isn’t more depth so where do you take them to? And with the establishment of the Common Core and things being very grade level specific where do we go- where do we challenge our other kids who may have a solid understanding? (observation, March 19, 2015)

Melissa's inclusion of fraction operations as an example did two things here: it both brought mathematics to the fore and more concretely described the tension between being true to teaching the content standards and not challenging all students adequately.

Lastly, in response to a question from Kathy, Melissa talked about the sources of students' uneven proficiency across mathematical topics and reiterated her uncertainty about meeting their learning needs:

... partially because they have high interest and they themselves have explored, partially because mom and dad want them to be getting into accelerated math and have tutored them their whole life and I struggle with what is expected of me in terms of differentiating? ... So I still struggle with what depth can I do or where can I take them because am I stepping on someone else's toes...I was pulling out sixth grade content and all of these kids were like I've already done that. So I just struggle with what I can or cannot do.... (observation, March 19, 2015)

This chain of excerpts revealed the dual aspects of Melissa's uncertainty: her responsibility for meeting highest ability students' needs and the depth to which she can take these students given grade level content alignment. Jack too saw the group's continued discussion over the appropriateness of certain grade level tasks as evidence of confusion. In an interview, he remarked, "it's not very clear, so there's a lot of discussion of is this a sixth grade task vs. seventh grade and then it's difficult to try and think about extending problems for students without pushing them into another grade level. And so looking at depth instead of you know, moving them, moving them forward" (J. Monroe, interview, April 20, 2015) remained a challenge.

This dilemma persisted in part because Melissa continued to question her capacity to engage highest ability students with CCSSM aligned content. In the meantime, however, another decision intervened as teachers working on the materials pilot recommended using CMP3 as the “backbone” or central curriculum. As part of the supporting rationale, Barbara specified one benefit as the ability to delve into 7th grade materials since the seventh and eighth grade teachers elected to continue with their traditional textbook. She observed, “at the end of the day for us, the CMP is easier to supplement. That gives us more autonomy” (observation, April 30, 2015). Later, facilitator Erin reframed the benefit of having continued use of select 7th grade units as “a nice option for differentiation” (observation, May 7, 2015).

Finally, during the summer work session, Melissa reasserted her uncertainty about her responsibility to meet the needs of highest ability students vs. those at grade level or struggling, about which she has greater clarity. At this meeting, Erin captured the various ways teachers worked to meet high ability student learning needs (6th GR Math Meeting Notes 2014-15, May 7, 2015) and the Clark principal reassured them she knew “so much good that is happening” (observation, June 15, 2015) in their classrooms. In a subsequent interview, Kathy remarked that her review of student data shows comparable growth across classroom. Yet, the conversation about how best to differentiate instruction for highest ability learners remained unresolved.

This dilemma represented the richest and most extended platform for sensemaking throughout the observation period, and one that was explicitly connected to CCSSM implementation. Teachers found that some students continued to arrive from fifth grade with strong conceptual and computational understanding while others had obvious gaps that were more pronounced since the adoption of new fifth grade materials and incorporation of CCSSM grade level content standards. Related to the better prepared students, tighter alignment to these

new content standards put additional pressure on teachers to differentiate instruction without introducing content from higher grade levels: it took away a longstanding tool from them.

Melissa, the teacher with the most obvious questions in this regard, also noticed that CCSSM's introduction of many topics in fifth grade to be solidified in sixth (M. Gordon interview, May 1, 2015), created a blurry line for teachers. Curricular freedom or content flexibility in one grade therefore seemed to narrow teachers' choices in the next grade. And as facilitator Erin noted, trying to align "all at once" to the CCSSM was messy in the short run, as teachers sought to understand new expectations, adapt their teaching to those new expectations and address gaps in preparation levels of the particular students they had in front of them.

More broadly, this notion of messy alignment seemed at odds with the highly concrete learning expectations for each class, each year, even before layering on the concept of differentiating instruction for a range of students. Messy alignment in actual implementation also contrasted with policymaker expectations for the CCSSM-aligned PARCC assessment to simplify instructional choices. Thus, Melissa repeatedly raised a multi-faceted problem of instruction and teacher expectations that involved conceptual and practical tensions as well as reflected an implementation timeframe that spanned beyond the immediate school year. It was in the true sense of the word, an enduring dilemma.

Sense that is made about differentiating for high ability learners. The sense that teachers tried to make about grade level alignment of content and differentiating instruction for highest ability students occurred on both a practical and conceptual level. As mentioned above, teachers chose CMP3 curriculum materials in part because they provided for flexibility for teacher choice in supplemental materials and the ability to intersperse seventh grade units. Choosing grade level aligned materials that also offered task and higher-grade content flexibility

to teachers seemed like highly practical sense made about a rather concrete decision. However, the group only summarized rather than deliberated their decision-making in observations (observations, April 30, 2015; May 7, 2015; June 15, 2015). Therefore, Melissa's continued uncertainty over her role in differentiating for high ability students more readily illustrated how teachers tried to make sense of the more conceptual dilemma in professional conversations.

Over time, Melissa's repeated uncertainty about her responsibility to reach highest ability students set the stage for others to share their views and differing approaches in a way that her many knowledgeable, but declarative statements about the CCSSM did not (observations, January 15, 2015; February 9, 2015; February 11, 2015; March 19, 2015; April 30, 2015; May 14, 2015). To recap, Melissa first referenced uncertainty in implementing the curriculum pilot (observation, February 9, 2015) when she admitted to Barbara, Kara, and Erin, that she was not differentiating instruction in order to be true to the materials under consideration, and yet is bothered by two students' boredom. An eight-minute conversation followed among these educators about various content and non-content (e.g., deeper questions) ways of differentiating instruction, student perceptions, coherence, and the conceptual link between fraction and ratio equivalents. However, the conversation essentially remained a more general discussion about differentiation and teachers' responsibility to challenge students whether piloting new materials or not (E. Hooper, observation, February 11, 2015).

In that instance, Melissa raised a general uncertainty about differentiating instruction while piloting new materials, and other participants responded *without* turning talk more toward mathematics (Horn, 2010). For example, Barbara told Melissa to go back to the way she had been teaching immediately, creating different tasks for different levels of students and Kara admitted she provided different tasks for those who finished the pilot work quickly. Both of these

teachers referenced student thinking, compared teaching approaches, and asked questions of Melissa, all of which pertain to the exchange quality of this professional conversation. But the interaction lacked any specific mathematical focus, with only the briefest of mentions about equivalency.

A couple of weeks later, in response to the principal's broad question about differentiating instruction, Melissa's response about teaching with more depth when students have mastered fraction operations, set forth two rather concrete questions in service of meeting high ability student needs. In addition, Melissa offered some alternative reasons why sixth graders may be familiar with grade level content because of their fifth grade instruction, higher than average aptitude or having been tutored. In this instance, Melissa phrased her thoughts in questions, which other teachers did not answer directly. However, her uncertainty left room for individual teacher interpretation. So Phil responded to Melissa, indicating that content sophistication was his way into meeting the needs of high achieving students, then Jack described his own increased understanding about math through teaching six grade content year in and year out, and Kara mentioned student acceleration as an option employed by other districts. Again, this exchange contains little focus on mathematics principles or concepts but yielded multiple interpretations from teachers. In other words, participants shared ideas about content and referenced boundary items like the CCSSM as rationale for their comments, but they did not deeply engage in a discussion about mathematics teaching.

Finally, in the opening summer work session, Melissa responded to the Clark principal's question about differentiating math instruction with a statement that both echoed and expanded on what she said previously:

I as a teacher still do not know where I stand with meeting my kids' needs. I've heard in the last year that yes, we have to push our kids and meet them where they're at...but there is some content in the sixth grade that I do not mathematically know how to go into more depth on. Our original ratio unit-- once a kid and a lot of our kids have a depth of understanding, then I give them a task that takes them into Base 5 but once they get that, I don't know how to differentiate much more beyond that. I don't know mathematically what's the next step is. So even though I am considered a math specialist, there are some areas that I'm not sure where that next phase should go. (observation, June 15, 2015)

Here Melissa again began with her uncertainty regarding differentiating instruction, but then became more specific about her own mathematics knowledge about ratios and how to deepen students' understanding of this topic. Her comments reflected her understanding as an experienced middle school math educator, but one who still had more to learn about teaching ratios to high ability students.

Following these statements, Melissa added that she usually used parallel tasks to challenge learners of different abilities. Phil immediately challenged Melissa to consider using more project based learning because "when you teach tasks, they're almost like potato chips. You just [go through them] until you run out, right?" Returning to Melissa's ratio example, he declared:

I think we can teach ratios to a group of kids ... where you tell them it's a comparison between two different quantities, oranges to apples. Yadda yadda yadda- done. We all know what ratios are. They're smart kids, they're going to get it in the first five minutes if they don't know it already. But that's when

you get into a project and really talk about the theme that gets into the depth of ratios, where they haven't seen or heard Or they're given an in-depth situation to solve and it's not going to take five minutes but is a long-lasting thing. Then they're being challenged. They're being asked to think about ratios in a whole different light (observation, June 15, 2015)

By referencing Melissa's concrete question about how to deepen students' understanding of ratios, Phil turned his message from general advocacy of project based learning vs. tasks to thinking about how to embed teaching of ratios in a larger context, that tests students' "elasticity" rather than automaticity. Phil's articulation of different ways to compare or scale ratios revealed some of his content knowledge and added more mathematics to Melissa's original example. Thus, in the words of Horn (2010), Phil's comments helped turn the conversation more towards mathematics.

However, with Phil admittedly short on specifics about project-based instruction, principal Kathy Wise once again pressed teachers to describe exactly how they differentiated math instruction. Those present generated at least five other ways than parallel tasks or project based learning (6th GR Math Meetings 2014-15). While talking about how they differentiated instruction, teachers referred to a range of boundary items: books written by Small, Carpenter et al., and Boaler; routines based on visualpatterns.org or marcycookmath.com; Bloom's Taxonomy; as well as constructing and critiquing argument as a CCSSM practice standard (observation, June 15, 2015). In this conversation, teachers mentioned boundary items as shorthand for definitions or ideas about practice as well as added support for their own and others' statements. For example, Jack mentioned the power of students "creating their own Marcy Cooks" (tile cards) and seeing if a fellow student can figure out what they have

constructed. Phil's quick reference to creation as the highest form of learning in Bloom's Taxonomy and Erin's reinforcement of the need for students to construct and critique argument per the CCSSM practice standards built on Jack's example of how he engaged high ability learners. Said another way, Jack first shared an idea about practice using Marcy Cook tiles, then Phil's and Erin's introduction of other boundary items deepened the conversation by adding a conceptual and policy basis for encouraging student creativity. These conversational moves not only offered additional supports for Jack's practice choices, but in the context of my theoretical model, they made more participant resources available to the group.

Furthermore, in these moments of extended interaction, Kathy made clear that the task goal was to share best practices for differentiating mathematics, and teachers shared practice choices supported by a range of rationale like student behavior, the concept of creation, and a CCSSM practice standard. Simply put, although the dilemma of grade level content vs. differentiated instruction remained unresolved, over the observation period the conversation shifted from one teacher noting her uncertainty about differentiating with new curriculum materials to the principal ensuring all teachers shared elements of how they differentiated math instruction, with some teachers introducing boundary items to support and strengthen others' practice choices.

As indicated previously in Figure 2, participants engaged in the first four analytical steps of sensemaking: Kathy's clarified the conversations' task/goal and teachers referenced various boundary items in their explanations as well as incorporated concrete math concepts examples, references to student thinking, and descriptions of multiple approaches to instruction. These elements evidenced good exchange quality and that a mathematical conversation about practice took place. Over time, Melissa's articulation of an increasingly specific uncertainty about

differentiated mathematics instruction (the dilemma) coupled with the principal's explicit interest in getting teachers to share successful practice elements (as the task goal) provided a platform for sensemaking. Although no resolution took place, above excerpts showed how teachers came to compare differentiation approaches as the principal insisted on continued reflection. Again, the intensity and pervasiveness of leader messages per Coburn (2004) seemed motivating factors for teachers opening up about their practice. However, it was Melissa's expressed uncertainty that created openings for group discussion of a complex instructional topic of long local interest brought into sharper relief by grade level CCSSM content.

Dilemma 2: Teaching for mastery as good math teaching vs. teaching for test coverage. Over the observation period, several educators distinguished between teaching for results measured by annual standardized tests (what the state asks) and for content mastery to fuel students' continued progression in mathematics (what Fairfield Oaks values). Despite some brief mentions of the policy signals under study, local factors seemed to play a more central role in this second major practice dilemma. According to Erin and Phil, who each had about twenty years of in-district experience, the dilemma between teaching students for mastery or to maximize certain test scores predated the current policy environment. However, recent community concerns about curricular coherence (C. James, field notes, May 21, 2014; P. Patton, interview, April 13, 2015) and comparisons of student placement results with surrounding school districts (focus group, December 18, 2014; E. Hooper, interview, April 9, 2015) brought some tension to teachers' views about what constituted good math teaching.

To begin, in both collective conversation and individual interviews, participating educators spoke with pride about their decision-making abilities (K. Bishop, interview, May 1, 2015) to do what's best for students over their longer arch of learning (P. Patton, interview, April

13, 2015; observation, May 14, 2015) rather than focus on short term test results (M. Gordon, observation, May 1, 2015). Correspondingly, observed teachers saw instructional approaches that potentially maximized standardized test scores as incompatible with principles they associated with good math teaching like emphasizing conceptual understanding and deep problem solving. Not only did they feel mastery oriented instruction ultimately benefits student learning, they also found it more difficult than what they said Jo Boaler terms “production” or reliance on repeated practice of certain algorithms (focus group, December 18, 2014).

In this very first observation, Erin noted, “It’s really hard to teach that way and step back and let student thinking guide the way. And so it’s much easier to say here’s the algorithm and you do it now. You perform it.” Later in the conversation, she elaborated “we see you’re going to have the greatest advantage if you understand math and can use it ... in your daily life. If you’re pushed-into-these-things-so-you-can-get-to-this point six years from now then there’s a high likelihood you’re not going to understand it and you’re going to burn out and flunk out and not like it, not want to go forward with it” (focus group, December 18, 2014). Erin’s comments here suggested that these teachers thought differently about the locus of student learning goals and the time scale for measurement than policymakers might; focusing more on students’ depth of understanding, intrinsic motivation, and long-term subject liking rather than external and comparable measures of proficiency in timed, annually administered, standardized tests.

Similarly, Phil’s negative opinion about the PARCC test platform contradicted the theory of measurement that policymakers intended for this standardized assessment. Furthermore, this teacher made explicit the conflict he saw between teaching for mastery and optimizing test scores, when he characterized the PARCC as a

chore to watch these kids go through because that's not the way we learn.

It's not indicative of the way we teach. You know we tend to be pretty hands-on in here and all of a sudden you have them sit in front of a computer and that's very different....Is it more important to continue to what you think is really good teaching or should we change what we do so they can score well on these tests?

And that's you know, that's the dilemma. (P. Patton, interview, April 13, 2015)

Phil compared the screen-based PARCC test format with the “hands-on” learning that went on in Clark classrooms as evidence of incongruent demands on teachers, whether to boost near-term standardized test scores or undertake “really good teaching,” for subject mastery. In truth, his dismay over the PARCC testing platform represented a small slice of a broader concern about the difference between what teachers considered high quality instruction and how some others, in the broader community, media, and policy arenas, conflated high-test scores with good teaching.

To be fair, the contrast between teaching for mastery and optimized test scores arose in a couple of observations to explain recent high school placement trends. Again, this placement exam along with first semester high school grades, served as key indicators of students' educational progress that parents valued and to which educators paid attention. Given my interest in teachers' policy convergence experience through their opportunities to learn, it was important to note that inquiry into how these educators' teaching of mathematics adequately prepared students for competitive high school placement centered on an assessment other than the PARCC. What's more, this dilemma underscored how local placement results inspired questions about teaching for mastery or to optimize student scores in ways that initial administration of the PARCC did not. Although teachers mentioned boundary items or policy effects as part of the conversation, this dilemma did not originate from the current implementation environment.

Instead this dilemma revolved around teachers' fundamental beliefs about the goal of instruction and parents' concerns over high school placement results.

Sense that is Made About Teaching for Mastery. When the Clark principal initially asked teachers about how they meet individual students' needs, several of the educators described other practice dilemmas that preceded implementation of the standards or other policies. For example, Phil mentioned the importance of teaching with sophistication for longer-term retention rather than ways that might help a class speed through a topic. He asserted that teaching for mastery takes more time than relying on algorithms, as "you can teach a kids how to multiply two fractions, you can teach a kid how to find a percent in minutes...mastery takes more time" (observation, March 19, 2015), a point originally made months before by facilitator Erin (focus group, December 18, 2014). He then continued to make the case for sophistication of content, about students "excelling" rather than racing to the next topic, and referenced his stock market unit as a deep application of topics covered in less depth by published curriculum materials. In this way, Phil shared his ideas about good mathematics practice (Horn, 2010) that aided not only students' retention of material but gave them "a better background in mathematics." In closing he expressed his uncertainty whether this approach would serve them well in high school.

Subsequently, Jack asked for clarification about whether Belmont High has had a "shift in thinking with the Common Core toward modeling or are they" before Phil finished the thought, "still cranking out fifty problems a night?" After Kathy confirmed the latter, Jack then outlined his uncertainty about how teaching for mastery relates to boosting student's high school placement results. He contrasted Fairfield Oak's approach to mathematics as based on conceptual understanding and mastery of fewer, deeper problems with more traditional teaching

that relies more on the use of algorithms and volume of student practice, wondering if the latter boosted placement test scores.

In the above exchange, Phil and Jack both expressed uncertainty and seemed to compare instructional approaches, with Jack citing a particular CCSSM practice standard to illustrate the conceptual emphasis Clark teachers preferred and Phil alluding to a difference in the depth of student thinking about mathematics that resulted. Based on Figure 2 above, these conversational characteristics indicated some form of mathematical conversation occurred and contained a reference to at least one boundary item, the CCSSM practice standard. However, since no other participant took up these issues, it is hard to argue any real sensemaking took place to this point.

Moreover, the Clark principal re-directed and drew this conversation to a close by asking the group “to think about why have we talked about this forever, what can we do about it,” before clarifying the “it” as “if what we’re doing truly is best practice then why are we seeing this discrepancy [in student scores, placement levels, and grades] and what can we control about closing the gap [between Fairfield Oaks’ placements/grades and other peer schools]” (observation, March 19, 2015). The principal summarized this reflection point so that the starting and ending goal of this preliminary discussion was to get teachers thinking about what “controllables” might influence the placement outcomes of highest achieving students. She used the high school placement results as a focusing boundary item and expressed uncertainty over causes of recent data trends. Yet, in keeping with the stated conversational goal, this exchange largely concerned instructional choices in general, with only Phil and Jack’s rationale touching on mathematical practice to a very limited extent.

After the dilemma resurfaced in June, Kathy maintained that if Fairfield Oaks believed so strongly in the power of teaching to the whole child, differentiating to each student's needs, and if "it's the best way [to teach] then we should be competitive" in high school placement results. She then added, "I believe that we can, but I think we're missing something, right now. And I don't know what it is. I don't know what the answer to that is" (K. Wise, interview, June 26, 2015). Even after a couple of hours when teachers spoke at length about the ways in which their mathematics teaching aims to reach highest achieving learners, the principal continued to see a disconnect between teachers' intentions for practice and the uncompetitive results (with other local districts). Clearly, this practice dilemma remained alive and well, with much sense yet to be made among these educators.

Conclusion

In conclusion, the unresolved nature of these two practice dilemmas did not mean educators made no sense about them. These dilemmas pointed to ongoing problems of practice under discussion, originating in part from local concerns or values that conflicted in observable places with implementation of new standards or recent high school placement test trends. Description of the profiled dilemmas aimed to show 1) two instances of interim sense made and 2) how different participants and conversational moves set the stage for continued sensemaking about reaching highest ability students.

In the first dilemma, teachers' choice of a curriculum that allowed for more supplemental tasks seemed concrete sense made of how to enable differentiated instruction within the CCSSM's grade level bands and remain true to their preference for teacher agency. Yet, the fundamental dilemma of how best to balance highest ability learner needs and more specific

grade level content remained unresolved. Teachers recognized the new standards challenged their previous reliance on higher-grade level topics with students and worked to balance implementation fidelity with teacher autonomy and instructional ideals.

Regarding the second dilemma, the concept of teaching for mastery figured prominently in discussions prompted by the principal following community attention to high school placement results. Hence, and unlike the PARCC, the placement exam was not just another low-value summative standardized test—it determined tracking for students in high school and in parents’ eyes at least, their future prospects. In sensemaking terms, the Clark principal made the teachers aware of recently declining trends for top-level placements and twice asked them to stop and consider how their teaching advances highest ability students’ learning. However, only the principal explicitly related the discrepancy between the two to sixth grade instructional choices. In response, teachers’ prior categorization of information seemed to hold as they found their rationale for mastery compelling in the face of new information about declining placement test trends. They acknowledged the importance parents place on high school placement results *and* their convictions that teaching for mastery underpinned long-term student learning. Still, the principal pushed them to interrogate how done well, teaching for mastery should equate to strong placement results. Teachers’ explanations about instructional approaches for mathematics seemed a first step toward this goal, but little new sense emerged in this area over the observation period. Without more disruption, teachers shared ideas about teaching for mastery but did not reconcile the dilemma posed by the principal.

Discussion

Policymakers' efforts to link multiple policies to focus mathematics teaching in a certain way did not account for a variety of local factors that could influence how teachers experience convergence of new demands for instruction, aligned student assessment, and professional evaluation criteria. For example, administrator sensegiving about policy convergence and implementation reflected Fairfield Oaks' distance from the threat of negative state sanctions, historically low values for standardized testing, and high regard for teacher agency. Leader direction that incorporated these local factors helped shape how observed teachers experienced the new policy order, which in turn, influenced the contours of their informal learning opportunities about the CCSSM, the PARCC, and professional evaluation changes. At the same time, strong and coherent learning supports in the form of well-established collaboration, daily planning time, skilled facilitation, and abundant knowledge resources made this single case study revelatory (Yin, 1998). In fact, this study illustrated how these learning supports in service of policy implementation actually insulated teachers' practice from more prescribed mathematics instruction anticipated by tighter policy linkages. Thus, and despite policymakers' intention for aligned policies to be "mutually reinforcing" of instructional change, educators in this school community experienced the imposition of the PARCC exam as "interference" and compartmentalized the assessment's potential effect on future professional evaluations as a form of "cumulation and overload" (Knapp et al., 1998).

Correspondingly, the practice dilemmas to which observed teachers paid the most attention in opportunities to learn differed from anticipated problems of multiple policy convergence outlined in Chapter Two. Instead, these math educators struggled to reconcile the CCSSM's more explicit grade level expectations with their practice ideal of challenging highest

ability students through differentiated instruction as well as debated the implications of teaching for subject mastery rather than test coverage. These dilemmas, representing the sense teachers tried to make about problems of practice, reflected points of conflict between local factors and new policy signals. The nature of these dilemmas also indicated that coupling instructional and accountability policies may incent, but does not guarantee, a fixed set of educator responses to new practice demands.

In essence then, this study poked holes in two fundamental premises of policymakers: that 1) closely aligned standards and accountability policies incited more uniform instruction in a certain way and 2) robust professional learning conditions would advance faithful implementation of coupled policy goals. In order to substantiate these points, discussion begins with a summary of how teachers actually experienced policy convergence in a distinct local context, then turns to how this convergence experience shaped observed opportunities to learn and sensemaking processes contained therein, before describing how local factors, convergence experiences, and opportunities to learn contributed to the sense teachers make about individual problems of practice.

The Prevailing Policy Logic and How Teachers Actually Experienced Policy Convergence

Once more, coordinated policies aimed to more directly influence mathematics instruction, which student assessments like the PARCC would measure in particular ways, and ultimately factor into teacher performance outcomes. In other words, this new policy arrangement heightened the emphasis on individual teacher accountability as an additional lever to focus instruction. Accordingly, these “mutually reinforcing” (Knapp et al., 1998) policies suggested a more specific logic model than a sole reliance on standards to improve mathematics

instruction. A chain of objectives aimed to 1) focus teacher instruction 2) to improve student learning 3) as measured by newly aligned assessments 4) so more students become career and college ready by high school graduation. In terms of accountability, aligned student assessments connected standards adoption and teachers' own performance measurement. Further, policymakers saw enhanced college preparedness for students as a universal goal.

By contrast, this case illustrated how for some teachers, associated performance penalties and/or the espoused benefit of enhancing students' college readiness might figure into their convergence experience only to the degree they are relevant. In addition, other district-level factors, such as student achievement levels and certain values about practice, can impact teachers' initial understanding about policy signals, and thereby contribute to how they experienced and responded to convergence. Both prior research and empirical evidence from these observed educators helped point out limitations in policymakers' linear modeling of practice outcomes that do not recognize the necessity of key district supports to successful implementation of policy.

In terms of model assumptions, the expectation that tighter policy linkages on their face would motivate instructional changes contrasted with prior educational research that described how regular opportunities for sensemaking about new policy direction can serve as a critical mechanism in the adoption of practice change. As such, policymakers' external, variable-oriented approach did not account for any complications that can arise when teachers make sense of new direction in their local context. For now it is most important to note that this omission became more evident as implementation unfolded, when discrepancies arose between what policymakers intended and how teachers actually experienced policy convergence. In addition, prior research also indicated that teachers often experienced convergence in myriad ways, from

rejection to conflict to compliance or practice transformation. Consistent with Mayrowetz (2009), this group of teachers favored implementation of new standards over the other two accountability policies. Related to how teachers experienced convergence, this case raised issues with the universality of logic model and the promised benefits of new policy linkages, two aspects that district sensegivers in this case interpreted in relatively consistent ways.

Firstly, in terms of policymakers' logic, this study showed that some implementation flexibility remained for these teachers, even under tighter coupling. This flexibility stemmed in part from the structure of new laws that link standards-aligned instruction and accountability measures and in part from how local district leaders interpreted them. For example, state policy provisions in Illinois mandated adoption of the CCSSM, yet offered some latitude in the implementation of new accountability measures. More explicitly, Illinois state law allowed districts to decide whether to incorporate the PARCC in professional evaluation criteria and/or choose from a menu of other student growth measures. With this in mind, Fairfield Oaks' administrative messages and district decisions to de-emphasize related accountability measures like the PARCC and its potential impact on teacher evaluation criteria simplified a complicated policy environment and minimized distraction from these two associated policies for teachers.

Moreover, despite understanding lawmakers' intention behind the linked policies, observed teachers failed to see how combining accountability measures with instructional direction benefitted student learning or strengthened their own practice. In other words, teachers embraced instructional change related to the CCSSM but remained unconvinced of other major tenets of policymakers' logic model. They rejected that the PARCC, which functions as the linchpin between standards-aligned instruction and their own performance evaluation, was a meaningful measure of student learning. Leader sensegiving and teachers' corresponding lack of

attention to PARCC alignment or practice implications of future evaluation criteria made space for an almost single-minded focus on instructional proficiency during informal opportunities to learn.

Secondly, although observed teachers worked diligently on improving instruction in line with CCSSM practices, they lacked much investment in the ultimate outcome of the new policy linkage. Policymakers' overarching goal of enhancing student readiness for college was simply not as compelling as in most districts. Fairfield Oaks graduates attend a high school with one of the highest median composite ACT scores in the state and close to 95% of them attend four-year colleges already (Belmont High School news, September 1, 2015). It stood to reason that if district students already achieved lawmakers' ultimate goal of enhanced college readiness without linked policy action, the urgency diminished for teachers to believe in the promise of the new policy order and pay attention to requisite accountability actions.

Thirdly, against this backdrop of state policy structure and district achievement levels, consistent administrative sensegiving about Fairfield Oaks' relative distance from state sanctions helped shape teachers' convergence experience. By way of illustration, the principal pointed out how the combination of the district's almost total reliance on local funding and students' longstanding level of high achievement protected them from negative state penalties that can pressure administrators and teachers into act in ways that do not really benefit children, but satisfies adult imperatives. She also believed that the state did not understand Fairfield Oaks' approach to teaching the whole child and set policy more narrowly than was comfortable for district educators. Furthermore, she linked Fairfield Oaks' lack of state funding with their ability to make more autonomous instructional decisions than what policymakers envisioned from aligned accountability measures. Therefore, as important features of the local context that remain

unchanged by the new policy couplings, the district's enviable financial position and level of achievement continued to exert strong influence on how administrators help framed convergence for teachers.

Not surprisingly, observed educators acutely understood how student achievement and funding differences between Fairfield Oaks and most other districts lessened policy pressures on them and thereby shaped implementation differently. Although only the principal explicitly mentioned the district's strong financial and student achievement profile, she and the teachers alike distinguished between the flexibility they enjoyed in responding to new demands for mathematics instruction and what colleagues in other public school districts must do for compliance. As an example of the latter, they cited other teachers having to follow explicit administrative direction to teach to the test in order to demonstrate progress toward enhanced college readiness for students. The principal, math facilitator, and teachers contrasted Fairfield Oaks' traditional lack of reliance on standardized test measurement and their reluctance to teach to any test with other districts' approach to assessment and instruction. In short, educators' own professional experience elsewhere and a shared recognition they enjoyed relatively greater autonomy to implement instructional changes they deemed best for students formed the basis of these binary views.

Said differently, a favorable arrangement of institutional factors at the district level allowed more implementation flexibility for these teachers even under tighter policy constraints. Related to the three policies under study, this case showed how relationships among linked policy variables can break down in actual implementation should the "carrot" of enhanced college readiness for students fail to motivate practice change nor teachers fear the "stick" of related accountability measures. This break in logic occurred because strong student achievement

lessened the reason to believe in the new policy order and make aligned accountability changes. At the same time, high achievement levels, combined with the district's funding profile, further protected teachers from potential penalties associated with rejecting the PARCC as a good measure of student learning or their own performance. In addition, administrators encouraged teachers to discuss instructional practice and downplayed the same for accountability effects. Their reactions to policy imperatives reflected important local factors and their resultant direction to teachers guided consideration of select information or interpretations about practice that also precluded others. Thus, the interplay among key organizational factors, leader sensegiving and problem framing, previously described by Coburn in her progression of school and district-level research (2001, 2004, 2005, 2006), shaped teachers' convergence experience, itself an important and ongoing input to their opportunities to learn.

How Teachers Experienced Convergence Shaped Their Opportunities to Learn

Observed interactions among a group of educators during informal opportunities to learn demonstrated how local context remains integral to organizing the work, just as Weick (1995) and others noted. Extending the example above, administrative sensegivers reinforced local factors that prominently figured into observed collaborative conversations about practice: agency remained a prized value for teachers who also had low regard for standardized tests as a determining measure of student learning. In this way, convergence of newly aligned instructional and accountability policy at times influenced these teachers' professional learning about practice, but the new policy linkages did not topple longstanding institutional supports for instructional decision-making.

Generally speaking, interactions among select boundary items, participant resources, and the structure of participation shaped the contours of teachers' opportunities to learn. This particular study of a well-supported and established teacher group's collaborative learning about multiple policies drew attention to how these component parts worked together in service of making new sense about mathematics instruction. From this vantage point, the case highlighted the inherent variability of teachers' opportunities to make sense of new directions for practice, even in what some might consider a best-case professional learning scenario.

Endowed with abundant resources in terms of collaborative time, professional network resources, and facilitation support, observed teachers relied on a rich array of boundary items, each other's knowledge, and familiar routines in opportunities to learn much the same way Stein and Coburn (2008) and Kaufman and Stein (2010) described. Their informal opportunities to learn were characterized by a regular meeting schedule, dedicated mathematics facilitator, and established collaborative routines, important elements that support teacher inquiry and facilitate practice change (Horn & Kane, 2015; Horn & Little, 2010; Spillane et al., 2011). Observed team meetings seemed an important site to raise and reflect on practice uncertainties these educators noticed in their classrooms. In fact, every participating educator mentioned their colleagues as a valuable resource for learning about practice and credited regular collaborative meeting time as essential to improving their own instructional proficiency. More precisely, teachers compared new approaches or elements of practice they have tried, sometimes because of another colleague's experience, as well as shared CCSM aligned tasks or web sources that they found useful. Not surprisingly, these collaborative characteristics are consistent with recent findings from a study of educators viewed as highly proficient in implementing CCSSM aligned instruction across five states (Kane, Owens, Marinell, Thal, & Staiger, 2016).

At the same time, examination of observed interactions with one other, boundary items, and other knowledge resources shed light on points of agreement and divergence among teachers' mathematics practice, new policy signals, and local values. First off, these teachers gravitated toward policy that reinforced their experience and beliefs about practice (Coburn, 2004; Cohen, 1990; Spillane et al., 2002). They keenly focused on aligning mathematics instruction with Common Core practice and content standards, finding that the CCSSM converged to a great extent with their established practice ideals. In this regard, numerous self-reports, conversations among these educators, and feedback from district administrators indicated a professional commitment to improve their mathematics practice in line with the CCSSM. Related to the standards, and most specifically the practices, all members of the sixth grade team including the principal indicated strong beliefs in instruction that fosters student-to-student discourse, encourages argument and critique, and emphasizes deep problem-solving, conceptual understanding, mathematical modeling and use of various tools. In truth, teachers' opportunities to learn about CCSSM practices and rearranged content added new dimensions to how they thought about mathematics instruction, but largely within existing frames of reference for what constituted good practice and quality teaching.

In professional conversations, these educators worked toward policymakers' ultimate goal of strengthening mathematics instruction. They repeatedly discussed the importance of alignment, coherence, assessment, and improving their math teaching, the very benefits sought by linking accountability policy actions to influence instruction. Equally important, leader sensegiving provided clear direction that guided teachers in how they spent their collaborative meeting time and implemented instructional changes. For example, these teachers have spent three years aligning curriculum goals, guidelines, and materials, without potential district or

individual teacher sanctions to ensure compliance, a “voluntary” approach Coburn (2004, p. 235) found supportive of practice change. Thus, teachers reported that implementation of CCSSM practices reinforced their prior beliefs about instruction and expressed ideals about good math teaching.

Moreover, Fairfield Oaks leaders encouraged observed educators to work together (within/across grade levels, schools, and districts as necessary) to figure out the best ways to implement CCSSM into their classroom instruction for coherence and students’ learning potential. This positioning of teachers and the math facilitator as the implementation experts both structured their learning opportunities about instruction in certain ways as well as satisfied longstanding local values for teacher agency. Regarding the former, teachers, the instructional coach or principal all posed problems of practice for consideration depending on the purpose of the learning opportunity. Sometimes the coach or principal set the meeting agenda and/or directed the questions: other times, the teachers directed the conversation via their questions about classroom practice and called on the coach as a resource. In addition to indicating certain workplace norms, this relatively open structure of participation again suggested that among these educators, any member of the group could function as a learner or leader, regardless of position. In other words, new instructional direction flowed through a supportive institutional arrangement and connected with teachers’ prior beliefs and professional experience during implementation.

Finally, teachers’ informal opportunities to learn were but one of many organizational supports for teacher learning about deepening students’ use of CCSSM practices. Said another way, teachers enjoyed many congruent sources of information about policy from which to learn. These teachers specifically benefitted from strong and vocal administrative direction and support, ranging from Superintendent communication to the community to persistent questions

from their principal about how best to meet student needs and learn from their own and others' classroom innovations. Various district accountability and communication vehicles like the Clark Middle School Improvement Plan, principal evaluation criteria, and student report cards all included the same measurement of student progress in CCSSM practice behaviors. In addition to the benefits of consistency, this decision offers compelling evidence of how educators might better understand "...the capacity of formative and summative assessments to measure the Standards for Mathematical Practice in valid and reliable ways" as outlined by the NCTM (2013, p. 347). In this case, educators chose not to rely on standardized measures contained in the PARCC assessment, but created a common rubric to assess students' use of CCSSM practices for incorporation into student report cards, professional evaluation, and community communication. Not only does this particular response align with the values placed on teacher agency and standardized test results, it also might mitigate one of the potential practice dilemmas outlined in Chapter Two. For example, incorporation of the same measurement of students' demonstrated use of CCSSM practices across evaluation tools for the school, principal, and children could counterbalance the concern that new evaluation criteria might not be specific to incent stronger mathematics instruction. In addition, Fairfield Oaks' use of this common rubric helped steer performance measurement toward valued mathematical practices demonstrated by students rather than either content-neutral teaching behaviors (as captured in the Danielson evaluation framework) or a reified test score or level.

Thus, a multitude of factors supported observed opportunities to learn about new instructional policy, beginning with teachers' own convergence experience framed by administrators' interpretations about policy and local values. In turn, these teachers refined their understanding of policy implications for their mathematics practice through regular interaction

with their colleagues, shared resources, and ongoing administrative sensegiving. Consistent with this district's value for agency, teachers' positioning as the implementation experts also encouraged them as learners and/or interpreters of policy direction. The manner in which these teachers, principal, and math facilitator questioned and actively learned from one another and various classroom experiences differed markedly from a learning opportunity in which a principal might give instructional direction for teacher compliance (Horn & Kane, 2015). That said, the observed group of teachers systematically responded to aligned organizational elements that directed their attention toward instruction and away from individual accountability consequences. Thus, as a platform for instructional change, informal opportunities to learn represented one of several coordinated efforts to encourage greater emphasis on the CCSSM practices.

Teachers' Lack of Sensemaking about Accountability Measures in Opportunities to Learn

Observed exchanges of ideas or questions about mathematical practice, and lack thereof, also revealed how established values for teacher agency and standardized testing helped shape what cues these teachers failed to pay attention to, whether they stopped to consider disconfirming information, or how certain conceptions of practice remained unchallenged. For instance, observed teachers showed near disregard of the PARCC or its potential effect on their future evaluations, thereby approaching implementation of the PARCC and future evaluation changes divergently from policymakers' expectations. These accountability measures did not align with most of these educators' beliefs or practice ideals. Moreover, district and school administrators advised teachers not to align their curriculum to the PARCC or use valuable instruction time to prepare students for test content. Accordingly, little collective discussion about this assessment took place in teachers' opportunities to learn outside of sharing negative

reactions to its scheduling implications. In these ways, observed educators differed markedly from highly proficient teachers surveyed about their practice habits in support of the CCSSM (Kane et al, 2016).

Furthermore, in interviews, most educators both described the overall policy goals of coordinated policy implementation in very concrete terms and minimized the effects of accountability measures on their teaching or evaluations. They simply did not internalize two of the three linked policies. This response followed from what they have come to understand about the role of standardized testing in Fairfield Oaks and what they recently learned about the PARCC from other district leaders and their own implementation experience. In truth, observed teachers' lack of confidence in the PARCC stemmed from a constellation of influences: from a local district history of de-emphasizing most standardized assessments, to the Superintendent's voiced concerns about the time and task involvement of the PARCC, and strong community opt-out decisions. At the same time, when Fairfield Oaks' leaders directed teachers to comply with administration of the mandated assessment, teachers reported responding accordingly. This reaction to the PARCC seemed to mirror Stein and Coburn's (2008) description of the "literal and procedural" compliance (p. 590) that often resulted when little shared meaning or experience connected the receivers of boundary items and their creators (policymakers). The fact that observed educators acknowledged no dilemmas related to new professional evaluation criteria, which mandates at least a 30% weighting of student growth measures, also seemed telling in a district that traditionally placed a very low value on such information. Once more, this complete compartmentalization of new evaluation criteria as the CCSSM and PARCC were implemented seemed a form of "cumulation and overload" for these teachers (Knapp et al., 1998).

In terms of sensemaking, one reason that these teachers may not have experienced current implementation as changing the relationship between instruction and student assessment was because observed opportunities to learn contained little disconfirming evidence that “shocked” the group enough to reconsider its practice in light of the PARCC. As Weick (1995) and others made clear, new information must inject enough disequilibrium to interrupt participants’ core activity, and demand reconciliation of prior beliefs or ways of doing, for sensemaking to occur. As elaborated in the Findings section, discussion about two instruction based dilemmas demonstrated the ways in which these educators asked questions, revealed uncertainties, and proposed different solutions to challenges posed by differentiated instruction or teaching for subject mastery. In contrast, and illustrating teachers’ lack of interest in new accountability effects, individual educators may have tried a PARCC practice test on their own time, but they spent little collective time analyzing the PARCC assessment, let alone questioning its relationship to their own practice. Although compliant in its administration, teachers rejected the new assessment not only as learners and community members, but as knowledgeable math educators, who had difficulty seeing how alignment to an un-validated assessment helped advance student learning or provide insights about what they held up as instructional ideals. Conversely, they spoke at length about the many ways they assessed students for learning as part of instruction as well as the communication value they saw in attaching rubrics to summative assessments to describe student progress to child and parent alike. They saw neither benefit in the PARCC assessment. As such, the new assessment fit neatly into their prior categorization of standardized testing.

Finally, teachers’ near disregard of accountability measures also seemed consistent with community concerns, as an impactful opt-out response to the PARCC also supported their

selective attention to policy implementation issues. In these ways, examination of this team's interpretations about the PARCC and implications for their practice responded to the NCTM's (2013) call for more research into "teachers' knowledge, beliefs, orientations, and practices related to assessment" (p. 348).

Select Practice Dilemmas as the Sense Made about Policy Directions in Context

This study highlighted educators' attempts to resolve two practice dilemmas that stemmed from uncertainty about their broad understanding about new policy and their own convergence experience. In fact, participants' ongoing discussions about these practice dilemmas showed how interactions between policy direction and well-established local factors shaped teachers' convergence experience and learning opportunities about policy as well as flowed through how they defined pressing problems of practice.

Again, observed educators embraced the CCSSM practice standards as consistent with their conception of what constituted good math teaching *and* held fast to locally low values for standardized testing and a strong desire for teacher agency. In fact, these three local factors figured prominently in the first major practice dilemma for these teachers: the struggle to ensure new grade band level content does not limit the learning challenge for high achieving students. Priding themselves on differentiating instruction to reach heterogeneous groupings' diverse learning needs, until recently, these teachers routinely dipped in grade seven or eight content as necessary. The imposition of more explicit sixth grade content standards seemingly removed one familiar means of differentiating instruction for top performing students. With this in mind, one teacher repeatedly expressed her uncertainty about differentiating using new curriculum materials and over the course of observations, narrowed her concern to her ability to teach ratios

in a manner that deepened certain students' understanding without relying on higher grade content. In response, the principal asked all teachers to share the many other ways they differentiated math instruction.

As part of this discussion, which took place intermittently over five months, teachers referenced a variety of boundary items like Bloom's taxonomy, the CCSSM practice standard about construction and critique of argument, or routines from visualpatterns.com as shorthand for definitions of ideas about or approaches to practice. Furthermore, the principal's continued urging of educators to share their experiences and resources illustrated the power of "congruent", "intense," and "pervasive" leader messages (Coburn, 2004, p. 235) to foster sensemaking. Although this dilemma remained unresolved at the close of observations, professional conversations over the period became more focused on specific mathematical concepts and analysis of ways to embed the teaching of ratios in larger, real-life contexts for students. Thus, teachers strived to make sense about practice choices that aligned with the CCSSM (irrespective of the PARCC), satisfied their ideals about good math teaching, and utilized various approaches to meet highest ability students' needs (teacher agency).

In terms of the second major dilemma, despite compliance with the PARCC's mandated administration, Fairfield Oaks' educators strongly voiced commitments to teach for student mastery rather than to optimize standardized test scores. In truth, they viewed this orientation to practice as a dilemma in the larger policy environment and potentially among some Fairfield Oaks' parents. However, as detailed in the Findings section this dilemma centered on high school placement test outcomes, and not the PARCC exam. For example, when discussing teaching for content mastery rather than optimized high school placement test scores, the principal admitted she did not fully understand how the former detracted from the latter. Over the observation

period, she probed teachers' choices to concentrate on deep problem solving rather than the use of algorithms and volume of student practice. Later, the principal stated her view that "not all teachers have to do it the same way" in terms of instruction, although they should satisfy the same learning goals that included both content coverage and the practice standards. In other words, she expected, and the others heartily endorsed, that individual teachers would find the way to best engage their students, by trying new approaches, learning from their colleagues, and adapting instruction accordingly. Teachers as well as the math facilitator and principal all saw room for continued teacher agency in successful instruction that aimed for subject mastery rather than coverage of specifically tested content.

This mastery orientation to instruction in general and support of teacher agency and focus on the high school placement exam in particular seemed to fly in the face of policymakers' intention to focus mathematics instruction and make it more uniform across classrooms, as measured by the PARCC exam. As a result, observed teachers did not behave in predictive ways as multiple policies converge in implementation. Namely, they did not focus on aligning curriculum to the PARCC, share concerns about impending student test results, or teach to that test to boost measurement of their own professional competency. Instead of aiming only for more uniform instruction, they shared the various ways they differentiated instruction for students and discussed high school placement test outcomes at length, rather than the PARCC. Therefore, coupling policies made it more difficult, but not impossible, for some educators to selectively make sense of new directions for classroom instruction.

To summarize, administrators directed teacher attention to CCSSM practices and content as well as emphasized the range of practice choices they might employ, with cover provided by strong student achievement levels and reliance on local funding. Furthermore, teacher

conceptions about quality math instruction and meaningful measurement of student learning helped justify both their adoption of instruction that aligned with the new standards and rejection of new accountability measures. This combination of framing policy convergence in line with existing educator beliefs about practice was a powerful force on the structuring of opportunities to learn, the practice dilemmas that arose, and teacher sensemaking that ensued.

Moreover, the study's phenomenon of interest offered a window into the longer chain of effects set into motion as new policies interacted with key local factors. This study's theoretical framework identified the potential bi-directionality of understanding about policy signals as impetus for and as an outgrowth of sensemaking, similar to Weber and Glynn's (2006) findings about how changes in context could both precede and emerge from that process. Alternatively, actual findings highlighted how the intersection of new policies and longstanding local factors functioned in this way. By shaping teachers' convergence experience and the contours of informal opportunities to learn, these intersections functioned as antecedents to sensemaking about practice. At the same time, teachers made direct mention of agency, mathematics practice ideals, and low values for standardized testing as part of professional learning conversations about instruction. Thus, these factors underlay the two major dilemmas discussed and directly affected the sense teachers tried to make of their articulated problems of practice.

As such, this case showed how observed teachers responded systematically to local factors and organizational elements, including, but hardly limited to opportunities to learn, that motivated them to improve instructional proficiency and shielded them from other effects of policy alignment. This group of educators did not respond to accountability measures aimed at driving more consistent mathematics instruction across schools and systems as outlined in the theoretical framework. Therefore, the favorable position of these educators, in terms of strong

learning conditions and rather congruent institutional messages, yielded neither a convergence nor early implementation experience according to the prevailing multi-pronged policy model. In this way, strong learning supports actually insulated educators from responding to new directions about practice as envisioned by policymakers.

Study Strengths, Limitations, and Next Steps

Linkages among the research questions, theoretical framework, multiple data sources, and analysis techniques strengthened case study findings. As a starting point, the choice of this revelatory case purposefully tested the sufficiency of policymakers' newly articulated model of convergence and expectations for more uniform implementation. Researcher decisions to apply more established research findings about sensemaking as the basis for practice change (Coburn, 2001; Spillane et al., 2002; Weick, 1995) and to recognize that teachers might actually experience multiple convergence responses (Knapp et al., 1998; Mayrowetz, 2009) to the linked policies contrasted with policymakers' view that linked policies would motivate practice change towards more uniform instruction. The propositions underlying the study directed the gathering of both confirming and disconfirming evidence of policymakers' stated logic in linking implementation of the CCSSM, aligned student assessments, and professional evaluation systems. Findings therefore documented instances of educators' experiences that both converged and diverged from policymakers' expectations.

In terms of theoretical generalizability, this study extended the use of Stein and Coburn's (2008) "architecture of learning" framework as a way to understand how active and well-supported learners navigated a complex implementation environment. More generally speaking, it extended Cohen and Hill's (2001) findings about teachers' needs for ample, meaningful

learning opportunities, “substantive coherence among the instruments of policy” such as instructional guidelines, curricular frameworks, and materials, as well as local supports for instructional change (p. 185). Irrespective of tighter coupling, this case confirmed a continuing relationship between teachers’ congruent beliefs or experience and how they embrace instructional change outlined earlier by Penuel et al. (2009) at the group level. From an organizational perspective, it demonstrated how local factors like values for instruction and agency continue to come to the foreground in implementation settings, regardless of how inconsequentially district elements might factor into policymakers’ expectations about outcomes. Finally, this study pointed to how characteristics like strong professional learning conditions, congruent administrative messages, and community support in a high achieving district, can favorably position educators to interpret policies intended to enhance uniformity of instruction, with greater flexibility than legislators envisioned.

That said, this case was neither representative of mainstream public educational conditions nor widely replicable, which hampers generalizability of other findings. For example, Fairfield Oaks’ particular combination of local values and distance from state sanctions hardly constituted the environmental norm among school settings. The structure of the descriptive case also precluded generalization of empirical findings in other contexts. In addition, an observational focus on informal opportunities to learn among a single group of educators skewed the balance of findings, as did the study’s duration and timing of data collection in advance of known PARCC results. This data collection period limited observation of longitudinal developments related to teachers’ opportunities to learn and issues raised might not be representative of participating teachers’ implementation experience over time. For example, uncertainties over new student assessments may increase once results become known and

incorporation of results into teacher professional evaluations are finalized this upcoming school year. Certainly as implementation of the aligned policies continues, other new uncertainties may take their place and they too lay outside the scope of this study. Finally, depth of experience as an individual researcher likely impacted findings as well.

In actuality, this study revealed more about supporting structures for sensemaking than actual sense made about practice, oftentimes inferred by what observed teachers did and did not comment on during opportunities to learn or interviews. Whether teachers' enacted instruction truly aligned with the new standards or remained aspirational, as found in Spillane and Jennings (1997) and Cohen (1990), remained outside the scope of the study, which focused on educators' asynchronous professional conversations rather than observed in-classroom activity. As Horn and Kane (2015) noted, teachers reconstructed selective aspects of their classroom practice in collective conversations that necessarily limited insight into their true practice choices while affording them the opportunity to reflect on and position problems of practice. However well opportunities to learn revealed conditions for sensemaking, this study's reliance on teachers' reflections about practice rather than on observed in-class actions thereby limited direct evidence of teachers' actual responses to practice dilemmas.

Therefore, next steps to strengthen study results could include observing classroom interactions for empirical evidence of sense teachers make enacting practice in the moment rather than solely after the fact in reflection; conducting research with sufficient duration to incorporate educator and community responses to PARCC results and the finalized teacher evaluation protocol; as well as analyzing comparative cases' implementation experiences with policy shifts in the same environment, as outlined by Kaufman and Stein (2010).

Study Implications

As indicated above, generalizing some empirical findings from this single case study should be done with caution. However, both findings and non-findings from this research suggested some implications across levels of policy implementation:

For policymaking expectations – Although unmotivated by related accountability measures like the PARCC or linked evaluation criteria, teachers in this case acutely focused on instructional goals like alignment to standards or concepts such as coherence in professional discussions about student learning. In other words, these teachers' rejection of the PARCC as a worthwhile indicator of learning or teacher performance did not preclude them from deliberating at length about the very issues thought central to CCSSM implementation and ultimately leading to improved instruction. At Clark Middle School, teachers seemed to do "the right thing" regarding CCSSM implementation because they believed in the practices, trusted their own teaching wisdom, called on extensive knowledge resources, and engaged in collaborative sensemaking. Invested and well experienced in the process of collective learning, these teachers appeared energized by CCSSM implementation challenges to their practice, and avoided conflicts inherent in associated accountability policies thanks to consistent administrative sensegiving. With this in mind, policymakers' coupling of accountability measures with instructional policy may have incited meaningful practice change for most, but not all districts. In other words, the new policy arrangement may not compel all groups of educators to implement direction for instruction, assessment, and evaluation as envisioned under the more elaborate policy structure. Without key district supports like aligned sensegiving and opportunities to learn, policymakers' variable based formula can be insufficient to drive anticipated practice changes.

For school level implementation: Leaders and organizational arrangements influenced how teacher enacted learning supports and as Supovitz (2015) noted, there is always a trade-off between fidelity and latitude. In line with this recent research, the case demonstrated when learning opportunities were not externally driven or prescriptive, participants' grappling of policy direction often relied on their own practice experience, routines, and leader expectations when constructing new meaning. Once more, this study's situated learning perspective favored variable rather than one fixed set of outcomes embedded in policymakers' logic model: accordingly findings demonstrated actions both in support of and in opposition to desired policy outcomes. Consistent with Cohen & Hill (2001), when policy direction met the local context in the form of values, common expectations, or organizational structure, meaning making was often messy and unpredictable. In this instance, years of collaborative discussion about practice cultivated certain participation norms helped reinforce the value of teacher agency and a somewhat shared sense of what constituted "good math teaching." Thus, established group routines for collaboration may have reinforced local values and practice ideals that conflicted in places with and/or further supported the adoption of new policy.

For teacher sensemaking: A highly resourced and networked teacher collective enjoyed an enviable position for professional learning, but one that did not guarantee meaning making in the way policymakers expected. As indicted in this study's theoretical framework, knowledge and organizational resources like regular time to meet may have created opportunities for sensemaking, but the process remained critically depended on leader direction, introduction of and reliance on aligned boundary objects, and effective facilitation that encouraged participants to raise, confront, and resolve issues of practice. Furthermore, teachers' dual positioning as

active learners and implementation experts contributed to their attempts at sensemaking about mathematics instruction. In particular, leaders' reliance on teachers to research, test, and recommend both curriculum materials and student proficiency tasks set high professional expectations for teachers' instructional practice. In particular, the many ways the Fairfield Oaks district connected the teacher-developed rubric that measured students' observed use of the CCSSM practices to reporting mechanisms and professional evaluation exemplified this high standard for practice. In fact, these teachers' active learning, whether taking the form of developing this student measurement tool, testing curriculum materials, or seeking out novel student tasks, demanded ongoing reconciliation of new practice demands and student learning benefits at a seemingly deeper level than compliance with linked policy directives might.

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Appendix A
 Site Pre-selection Interview Protocol
 For Curriculum Directors and/or Superintendent

This is a semi-structured interview protocol that attempts to get at initial understandings about a school district's approach to implementation of the CCSSM as well as their progression to-date and immediate next steps for working teacher groups expected for SY 2014-2015. To the extent possible questions will be asked as presented with probes used as necessary to uncover desired information in a conversational manner.

1. How is your district approaching aligning instruction to the Common Core mathematics standards?

Probes: What has been the timeline and steps/scope of change involved?
 What would you say the over-arching goals are of this work?
 What guided the development of these goals?
 What has your role been in this effort?
 How have teachers contributed to this effort?
 How does students' transition to the HS program figure into this work, if at all?

2. How would you compare this scope of work to previous efforts to change mathematics instruction in this district?

Probes: What has been similar/different vs. prior revisions to mathematics curriculum?
 Teacher roles?
 Emphasis on content and practices?
 Nature of expected outcomes?

3. How would you describe your district's readiness for PARCC testing in mathematics?
[Listen for any mention of field testing experiences]

Probe: What experiences or beliefs help you draw this conclusion?

4. At this point, how would you characterize teachers' levels of confidence and math competencies? *[Listen for middle school specific comments]*

Probes: What do you think has contributed to this shift (if any)?
 What if anything seems to hold teacher development back? Push forward?
 How much of a factor does the future inclusion of student growth measures in mathematics for teachers' evaluation seem to be?

5. Could you tell me more about how teachers work together in groups related to mathematics in this district?
[Listen for differences in elementary and middle school models]

Appendix A (continued)

Probes: In the middle school, how do these teacher groups function?
 How long have they functioned in this way?
 Who usually facilitates group discussions, how often, who is included?
 Can you describe individual roles and responsibilities?

6. Can you please describe the goals of teachers' curriculum work in mathematics for the upcoming school year?

[Listen for description of elements, timing, and roles for work completion]

7. Can you tell me where your district is in regards to revising its teacher evaluation model according to state requirements for inclusion of student growth measures and observations?

[Ask if the subject is not fully addressed by Q4 probe.]

Probes: What measures and weights are included?
 How recently has this model changed?
 What has been the general reaction of teachers to these most recent changes?

After a brief description of proposed study elements and timing,

8. What do you think your teachers' level of interest might be to be observed and share their impressions of ongoing work to implement the CCSSM?

[Listen for whom might be the point person going forward]

Probes: How would I need to proceed to obtain district permission to conduct my proposed study in 2014-15?
 Given what we've discussed today and my study interests, is there someone else with whom I should talking to?

Appendix B
 Post-observation Rubric
 Date/Time/Place

Map of Participant Arrangement:

Meeting or Task Goal:	Structure of Participation (e.g., meeting or discussion norms, leader role/direction, use of time, routines)
Mention or Use of Boundary objects (e.g. CCSSM, curriculum materials/map, student work or assessments, evaluation rubric)	Evidence of Participant Resources (e.g. expressed beliefs, experience, content knowledge)
Evidence of Mathematics focused discussion (mix of concepts/algorithms, questions/statements, misconceptions or divergent approaches)	
Practice dilemmas raised?	
Any resolution evident in discussion?	

Appendix C

Teacher/Facilitator Initial Interview Protocol

(before/as observations underway)

This is a semi-structured interview protocol that attempts to introduce the researcher and study elements to each participant and obtain initial consent. It may be conducted individually or in a group setting at the convenience of the participating district. To the extent possible questions will be asked as presented with probes used as necessary to uncover desired information in a conversational manner.

1. Please tell me about yourself and how you got to your current position.

Probes: How long have you been in this role and in this district?
 What experiences did you have before coming to this district?
 Can you please describe your educational background?

2. What does a good math teacher do?

[Listen for key words or phrases related to practice such as student focused, problem solving, mathematical reasoning, making connections, fluency, or conceptual understanding]

Probes: Ask what do you mean by _____?
 Can you tell me about a good math teacher you know or remember?
 How would you know if someone was a good math teacher?
 What makes for a good math teacher at this grade level? At this school?

3. How do math teachers work together in this school now that Common Core standards are being implemented?

Probes: How long have you been involved in this work?
 What does it entail?
 What kinds of topics do you discuss?

4. How does this collective work affect your classroom practice?

Probes: What is most important for teachers to learn now about the CCSSM?
 What aspects of the CCSSM feel most comfortable? Challenged by?

5. How is this current effort to implement CCSSM aligned instruction similar to previous curricular changes in which you've participated? Different?

Probe: How?
 What are your expectations for this effort in the upcoming school year?

Appendix D

Individual Teacher/Facilitator Interview Protocol

(during observational period)

This is a semi-structured interview protocol that aims to corroborate researcher observations and uncover more specific understandings about participants' experience learning about CCSSM implementation related to instruction, new student assessments, and potential effects on their own professional evaluations. Questions are grouped in categories for logic but may flow differently according to interviewee comments. To the extent possible questions will be asked as presented with probes used as necessary to uncover desired information in a conversational manner.

Thank you for taking the time to meet with me today. First, I'm going to ask you some questions that focus on instruction, then some related to new student assessments, and a couple related to your experience being evaluated as a mathematics educator. The closing questions address these three policies together.

1. Can you describe your impression of the biggest instructional changes going on right now in Grade _ mathematics?

[Listen for specific content area or practice mentions such as more focused student learning goals, tasks promoting reasoning and problem solving, better questions, more shared understanding in student conversations about math; building procedural fluency off conceptual understanding; allowing more student struggle in task completion; or gathering more student evidence about mathematics thinking]

Probes: What do you mean by _____?
 What would you say are the key messages you've been getting about these changes?

2. What has surprised you as you've begun to learn about and respond to these new math instructional demands?

Probes: In your classroom as a math educator?
 As a learner about new standards?
 As a member of this school community?

3. Can you tell me about your greatest challenge in making the current instructional shift?
[If already answered, modify accordingly: otherwise listen for content area or practice mentions as above]

Appendix D (continued)

Probes: Can you give me an example of a unit or lesson you've struggled with?
 What do you mean by _____?
 To what extent does _____ challenge your beliefs? Experience as an educator? Subject knowledge of mathematics?

Next, I'd like you to think more specifically about how the new student assessments may relate to new instructional demands.

4. How do you expect new student assessments aligned to the CCSSM to shape your teaching?

Listen for mention of PARCC tests or other district developed assessments and clarify to which respondent is referring.

Probes: Do you remember about the first time you learned about _____ assessment?
 How have you come to feel how you do about this/these assessment(s)?
 Can you describe your experiences to-date with _____ (assessment mentioned)?
 What are your expectations for the rollout of new student assessments in your classroom?

5. Thinking about your own teaching experiences and beliefs, does implementing standards aligned instruction and student assessments raise any dilemmas for you?

[Listen for mentions of new practice demands, conception of student learning etc.]

Probes: Could you tell me more about what _____ means to you?
 How are you dealing with _____ (dilemma just named)?

6. When you're looking for help about instruction related to the new standards or student assessments, where do you go for help?

[Listen for mentions of observed collective work with other educators]

Probes: Individual people/roles – why? In what ways?
 Boundary objects – which? Why?
 Experiences – which? How beneficial?
 What sources of information have you found most helpful?

Now, I'd like to ask you some questions that dig deeper into your own learning about new practice demands.

Appendix D (continued)

7. What information or experiences do you wish you had more of as you implement the new standards? the student assessments?

[Listen for mentions of collective interactions with other educators; internal resources such as knowledge of mathematics, prior experience with assessments, etc.]

Probes: Can you walk me through one of the more useful learning opportunities for you? What makes you choose this example?

8. I've been fortunate to sit in on a few of your math team meetings. In what ways, if any, have those meetings shaped how you make sense of CCSSM aligned instruction? *[if not raised in previous question]*

Probes: Can you point to something concrete in your practice that has changed because of these meetings?
What aspects of these meetings have been helpful? Regularity? Content? Format? Expertise shared? Questions raised?

I'd like to bring up another policy shift underway now and that is teacher evaluation.

9. Many districts are changing how they measure teacher performance according to new state requirements that call for inclusion of student growth measures by 2016-17 and certain ways of classroom observation. What has been your experience with a new evaluation model?

Probes: What is the biggest strength of the current evaluation model?
What is biggest need for improvement?
What about this experience do you find helpful to developing your teaching?
What about this experience do you struggle with? Why?

10. Considering all that is going on right now, how high a priority does this district place on teacher evaluation?

Probes: How is the evaluation model aligned to other strategic priorities in this district?
How would you describe the balance between formative and summative (development or accountability) purposes of teacher evaluation? Too much?
Too little? Just right?

Finally, I'd like to ask you about effects of the three policies, standards, assessment, and evaluation, all together.

Appendix D (continued)

11. Can you talk a bit about what kind of relationship you see among the new standards, assessments, and evaluation requirements?

Probes: Does “wearing your learner’s hat” change how you think about these three policies? If you think about them as a member of this school community?

12. Can you describe your emotional reaction to the new math standards, student assessments, and evaluation criteria as three sources of change right now?

Probe: Is there a metaphor, phrase, or descriptor that comes to mind about your position as a teacher amid these policy changes?

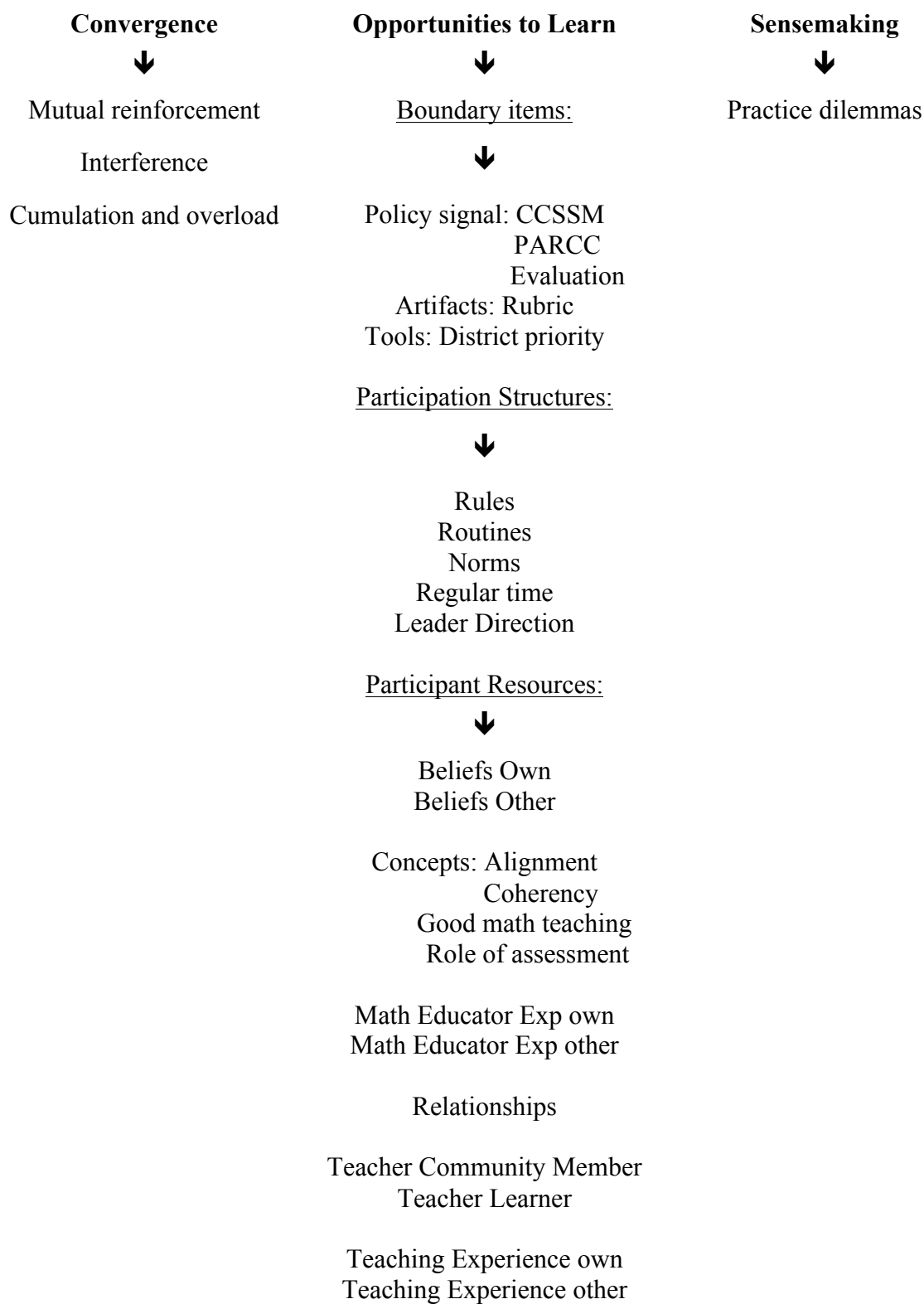
13. In our first conversation together, you told me that a good math teacher _____ . How do you think the implementation of new standards, student assessments, and evaluation criteria will change what good math teachers do?

Probe: Can you complete the sentence, in the future being a good math teacher will mean....

14. Is there anything else you would like to tell me about the new instructional demands or your expectations for the new assessments or evaluation model?

Appendix E

Focused Coding Scheme



Appendix F

Engaging in Mathematical Practices

Standards for Mathematical Practice	Evidence of Practices Examples and Student Questions that I can ask myself and others	Fall = F	Winter = W	Spring = S
		Beginning Awareness	Beginning Application	Consistent Application
1a. Makes sense of problems	Thinks about the meaning of the problem and determines the important information. Decides on an entry point.	Needs guidance to determine important information in a problem.	Determines important information and uses strategies to determine an entry point to begin solving a problem.	Plans a solution pathway rather than jumping into a solution attempt and monitors strategy to ensure it makes sense throughout all of the steps of solving the problem.
	Uses more than one strategy. Practices patience, persistence and flexibility. <i>Possible Student Questions:</i>			
1b. Perseveres in solving problems	<i>What is this problem about? What do I know? What do I need to find out?</i>	Needs encouragement to stick with solving a challenging problem.	Modifies approach in finding a solution to problem based on effectiveness of first attempt.	Persists with various approaches over time, and learns from previous solution attempts.
	<i>What strategies would help me solve this problem? When I'm stuck, what else can I try? Does my solution make sense?</i>			
2. Reasons abstractly and quantitatively	Uses models or pictures to make sense of quantities and their relationships in problem situations.	Uses one of the following representations to make sense of quantitative relationships:	Moves between various representations of quantitative relationships with guidance using:	Flexibly uses varied representations and approaches when contextualizing and decontextualizing quantitative relationships independently with:
	Understands that mathematical expressions can be converted to real world situations and visa versa. <i>Possible Student Questions:</i> <i>What's the meaning of the numbers I'm using? How can I use numbers, symbols, and models to represent real-world situations? How can I represent real-world situation using numbers, symbols and models?</i>	<ul style="list-style-type: none"> • manipulatives/ • pictures • numbers and symbols • real world situations 	<ul style="list-style-type: none"> • manipulatives/ • pictures • numbers and symbols • real world situations 	<ul style="list-style-type: none"> • manipulatives/pictures • numbers and symbols • real world situations

Appendix F (continued)

Engaging in Mathematical Practices

Standards for Mathematical Practice	Evidence of Practices Examples and Student Questions that I can ask myself and others	Fall = F	Winter = W	Spring = S
		Beginning Awareness	Beginning Application	Consistent Application
3a. Construct viable arguments	<p>Uses effective written and verbal communication to explain, defend, or critique mathematical understanding.</p> <p><i>Possible Student Questions:</i></p> <p><i>Why does that work? Why is that true? How did you get that? What is missing or flawed about this explanation? How can you clarify and/or explain your thinking?</i></p>	Explains what he/she did, but is unable to articulate why.	Explains what he/she did and why, but is still developing how to clearly communicate reasoning to others.	Justifies why his/her solution is mathematically correct using precise language so that reasoning is clear to others.
3b. Critiques the reasoning of others		Discusses others' ideas and approaches.	Explains other students' solutions and begins to identify strengths and weaknesses of the solution.	Uses mathematical arguments to evaluate various solution strategies and reasoning of others.

Name: _____

Grade: _____

Year: _____

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