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Lesson Study: Developing a Knowledge Base for Elementary Writing Instruction

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Abstract

Concern about students' writing skills has led to recommendations that elementary teachers receive more professional development in how to teach writing (National Commission on Writing, 2006). However, there is currently little evidence about the knowledge teachers need to teach writing well, and it is therefore difficult for teacher educators to design effective professional development experiences. What is needed is a better understanding of the knowledge base that informs teaching writing to elementary children. One possible means of gathering evidence about this knowledge base is through a collaborative teacher research process known as lesson study (Hiebert, Gallimore, & Stigler, 2002; Lewis, Perry, & Murata, 2006). Lesson study engages teachers in planning, evaluating, and improving lessons, so the process generates knowledge teachers find useful for their practice and may provide a mechanism for identifying some of the knowledge needed to teach writing. The goal of this study was to explore that possibility by describing the knowledge about writing instruction that elementary teachers generated through the lesson study process.

This qualitative case study drew on complexity theory (Davis & Sumara, 2006), to conceptualize lesson study as a knowledge producing process and the lesson study groups who participated as knowledge producing systems. It addressed two main questions: (1) How did the lesson study systems enable and constrain the knowledge about writing instruction that emerged through them? and (2) What was the nature and content of the knowledge about writing instruction that emerged through the lesson study systems? Four lesson study groups, two in each of two elementary schools, participated. Data was collected through videotaping the lesson study sessions, collecting the

documents the groups created during the lesson study process, and interviewing the participants after the lesson study cycle ended.

The findings indicated that instances of over constraint, under constraint, and enabling constraint occurred in each lesson study group and that the groups produced knowledge that varied in content and nature. In general, instances of enabling constraint produced knowledge that fit the criteria for professional knowledge outlined by lesson study proponents (Hiebert, Gallimore, & Stigler, 2002). Instances of over constraint and under constraint produced knowledge that did not fit the professional knowledge criteria. This knowledge may therefore be less useful for teachers outside the lesson study groups than for the teachers who generated it. The findings suggests that lesson study can, but does not always, produce knowledge suitable for the professional knowledge base for teaching writing. The implication is that, if lesson study groups are to generate knowledge for the knowledge base, they must be organized is such a way that they prompt enabling constraint within themselves.

LESSON STUDY: DEVELOPING A KNOWLEDGE BASE FOR ELEMENTARY
WRITING INSTRUCTION

by

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B.S., Oklahoma Baptist University, 1993

M.S., Syracuse University, 2004

Dissertation

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Chapter One – Introduction

In its 2003 report on the state of writing in America's schools, the National Commission on Writing reasserted the importance of writing in the school curriculum and recommended improving writing instruction through better preparation of writing teachers (National Commission on Writing, 2003). Specifically, the Commission called for required writing methods courses for all preservice teachers and ongoing professional development for inservice teachers. These significant recommendations acknowledge both the importance of preparing writing teachers and the fact that many teachers, particularly those in elementary schools, receive little or no guidance about how to teach writing. However, despite the potential benefits of increased coursework and professional development in writing pedagogy, designing such experiences is difficult because we currently know very little about what elementary teachers need to know in order to teach writing well. The most recent handbooks on research on writing instruction (Bazerman, 2008; MacArthur, Graham, & Fitzgerald, 2006; Smagorinsky, 2006) do not examine writing teacher preparation or professional development because the body of work that informs these areas is small and disjointed (Chambless & Bass, 1995; Colby & Stapleton, 2006; Davenport, 2006; Mahurt, 1998; Moore, 2000). As a result, teacher educators must create language arts method courses and writing professional development based on their best judgments about the content teachers should know rather than on empirical evidence about the knowledge new teachers need to teach writing.

One potential means of gathering evidence about the knowledge needed for teaching is through a collaborative teacher research process known as lesson study (Hiebert, Gallimore, & Stigler, 2002; Lewis, Perry, & Murata, 2006; Stigler & Hiebert, 1999). Because lesson study engages teachers in planning, evaluating, and improving lessons, the process generates knowledge teachers find useful in their practice. Thus, lesson study may provide an avenue through which to identify some of the knowledge needed to teach writing. The goal of this study was to explore that possibility by describing the knowledge about writing instruction that elementary teachers generated through the lesson study process.

Student Writing Performance

General consensus among educators, policy makers, business leaders, and the public is that writing in America “is not what it should be” (National Commission on Writing, 2003, p. 7). The introduction to the *Handbook of Writing Research* (MacArthur et al., 2006) notes, “there is considerable concern about the writing capabilities of school-age children and youth” (p. 1-2) in our country. This concern extends to the writing abilities of college students (Achieve, 2005; Bartlett, 2003) and to those in the workforce (The Conference Board, 2006). The recent publication of several writing handbooks (Bazerman, 2008; MacArthur et al., 2006; Smagorinsky, 2006), syntheses (Juzwik et al., 2006; Silva & Brice, 2004), and commission reports (National Commission on Writing, 2003; 2004; 2006), as well as the addition of a writing section on the Scholastic Achievement Test (SAT), also suggest that both academics and the public believe renewed attention to students’ writing skills is warranted.

Despite general agreement that students do not write well (Achieve, 2005; MacArthur et al., 2006; Troia, 2007), there are few large-scale measures on which to evaluate K-12 writing performance. The National Assessment of Educational Progress (NAEP), a congressionally-mandated achievement test given periodically to a nationally representative sample of students (Applebee & Langer, 2006), provides the broadest available indicator of students' writing skills. The NAEP requires students to write in narrative, informative, and persuasive genres for a range of audiences, including teachers, newspaper editors, potential employers, and peers. Results from the 2007 NAEP, taken by 8th and 12th graders, indicate that only 35% of 8th graders and 25% of 12th graders wrote competent or superior essays (Salahu-Dim, Persky, & Miller, 2008). Most scored at a "basic" level, denoting only partial mastery of the writing skills required for grade-level work. Fifty-eight percent of 4th graders, who took the NAEP in 2002, wrote at a basic level, while 14% wrote at a level below basic (Persky, Daane, & Jin, 2003, p. 28). Only 28% wrote responses considered proficient or advanced. Most produced compositions with underdeveloped ideas, disjointed organization, unsubstantiated claims, and grammar that interfered with the reader's understanding.

One particularly disturbing trend within the NAEP data is the large gap in writing performance between racial and socioeconomic groups. White students consistently outperform African American and Latino/a students, and middle-income students outperform those who participate in free or reduced lunch programs (Applebee & Langer, 2006). Although the gap has narrowed slightly over the past decade, on the 2007 NAEP (Salahu-Dim et al., 2008) African American 8th graders scored an average 23 points (on a 300 point scale) lower than their White peers, and Hispanic 8th graders scored an

average 22 points below Whites. In addition, 8th graders eligible for free lunch scored an average 25 points lower than those who were ineligible. Twelfth graders performed similarly, with a 23 point gap between Whites and African Americans, a 20 point gap between Whites and Hispanics, and a 29 point gap between students whose parents finished college and those whose parents did not complete high school. Fourth graders' scores on the 2002 NAEP (Persky et al., 2003) also fell along racial and socioeconomic lines, with White students scoring an average 21 points higher than African Americans, an average 20 points higher than Hispanics, and an average 22 points higher than Native Americans. The gap between students eligible for free lunch and those who were not was 22 points.

Other evidence of poor writing skills comes from high school graduates, their college instructors, and their employers. A survey of high school graduates and college professors (Achieve, 2005) found that 35% of graduates felt unprepared for the writing that college required, while professors estimated 50% of their students lacked the skills needed for college-level writing. A survey of college faculty in California (Intersegmental Committee of the Academic Senates, 2000) indicated only one-third of the students entering California colleges were adequately prepared to write an analysis or synthesis of information, the two writing tasks most frequently assigned by professors. Employers, too, indicate new entrants into the workforce lack the writing skills needed to succeed in their jobs. In a survey of over 400 employers across the United States (The Conference Board, 2006), managers rated written communication as their employees' most deficient skill, worse than both mathematics and reading comprehension skills. Seventy-two percent of employers rated workers with a high school diploma as having

deficient writing skills, while 46% rated those with a two-year college diploma as deficient, and 26% rated those with four year college diplomas as deficient. It is estimated that businesses spend \$3.1 billion annually to remediate their employees' writing deficiencies (National Commission on Writing, 2004).

While the statistics cited above are cause for concern, it is important to remember that the writing tasks on the NAEP and the writing required in college courses represent only one standard of writing proficiency. Students who struggle with academic writing tasks often perform competently when engaging in writing in their homes and communities (Cushman, Barbier, Mozak, & Petrone, 2006; Heath, 1983), so it would be inaccurate to claim that those who do poorly on the NAEP or other academic writing tasks cannot write. At the same time, however, students' weak performance on school-type writing assignments does have significant ramifications for those who strive to score well on college entrance exams and those who want to succeed in college-level courses. Poor writing also interferes with successful employment because proficient writing skill is a prerequisite for gaining and maintaining employment in almost every sector of the workforce (National Commission on Writing, 2004).

Writing Instruction in Elementary Classrooms

While the reasons behind students' struggles with academic writing are multifaceted and complex (Cushman et al., 2006; Murphy & Yancey, 2008), college students indicate that writing instruction exerts a powerful influence on their perceptions of themselves as writers (Norman & Spencer, 2005). Furthermore, correlational and survey research both indicate writing instruction impacts children's writing achievement (Applebee, Langer, Nystrand, & Gamoran, 2003; Fancsali & Silverstein, 2002;

Greenwald, Persky, Campbell, & Mazzeo, 1999). Thus, students' lack of academic writing proficiency raises questions about the type of instruction they receive in school. Research on effective writing instruction and research on the types of instruction that occur in elementary classrooms shed light on this question.

Research on Effective Writing Instruction

In 1986, Hillocks (1986) published an important meta-analysis of writing research conducted in elementary, middle school, high school, and college classrooms. He identified four different instructional approaches and calculated their effect sizes on student writing performance. The *presentational mode*, characterized by lecture and the use of models to demonstrate the qualities of effective writing, was the least effective approach (effect size .02). More effective (effect size .19) was the *natural process mode*, in which students wrote in journals, received primarily peer feedback, and had opportunities to revise their writing. Also more effective (effect size .17) than the presentational mode was the *individualized mode*, in which students received instruction on an individual basis through student-teacher conferences or programmed materials. The most effective instruction was the *environmental mode* (effect size .44). This mode is characterized by peer group activities that engage in students in problem-solving tasks that require them to use strategies parallel to the ones they will use when writing.

Sadoski, Wilson, and Norton (1997) examined the effectiveness of Hillocks' modes of instruction with 275 urban, suburban, and rural students in grades 1, 3-6, and 8. Students who received instruction consistent with the environmental mode made the largest gains in writing quality regardless of SES, primary language, place of residence, or gender. The specific combination of activities defined as the environmental mode in

this study included inquiry activities that led to writing, prewriting preparation for drafting, writing about literature, and the use of evaluative scales, such as rubrics, that reflected specific criteria.

In the years following the publication of Hillocks' (1986) study, interest grew in more strategic, process-oriented approaches to teaching writing in elementary schools (Chapman, 2006). One approach that dominated during the 1990's was the writing process approach (McCarthy, 2008). Process writing, also called writing process instruction, is characterized by student-selected writing topics, writing for authentic purposes, teacher-student and peer conferences, and time for students to move their compositions through phases of prewriting, drafting, revising, and editing (Calkins, 1994). While the early writing process approaches of the 1970's and 1980's encouraged teachers *not* to provide direct instruction and were more consistent with Hillocks' natural mode, current process writing instruction tends toward a balance between teacher-directed and student-directed activities (Pritchard & Honeycutt, 2006).

The effectiveness of process writing instruction is challenging to assess because teachers implement this approach in different ways (Lipson, Mosenthal, Daniels, & Woodside-Jiron, 2000; Pritchard & Honeycutt, 2006). In their review of research on process writing instruction, Pritchard and Honeycutt concluded that most studies demonstrate varying degrees of positive effects of process writing on student achievement, but the strength of this claim is undermined by uneven implementation of instruction across studies. Goldstein and Carr (1996) did find a positive correlation between process writing instruction and 4th graders' scores on the 1992 NAEP. In addition, Flood and Lapp (2000), in a review of process writing instruction, concluded

that it is “the most appropriate mode of instruction” (p. 234) for students in urban classrooms and those from diverse language backgrounds. However, other researchers argue that writing process approaches, as often implemented, provide fewer benefits for students from diverse backgrounds than for White, middle-class students (Delpit, 1988; Gutierrez, 1994) and may silence the voices of students from historically marginalized groups (Lensmire & Satanovsky, 1998).

A second approach that has dominated since Hillocks’ (1986) meta-analysis is explicit strategy instruction in writing (McCarthy, 2008). Strategy instruction focuses on teaching students to use specific strategies for planning, monitoring, evaluating, and revising their texts (Graham & Harris, 2005). For example, students learn the *Stop and List Strategy* for planning, which directs them to *Stop, think of purposes* (STOP) for writing and then to *List ideas, sequence them* (LIST). Graham’s (2006) meta-analysis of research on strategy instruction indicated it significantly improves the writing of elementary school children and is beneficial for high achieving, typical, and struggling writers as well as for students with learning disabilities. The average effect size for strategy instruction was 1.15, exceeding the effects of Hillocks’ most effective environmental mode, which had an effect size of 0.44.

A third, though less well-researched, approach to teaching writing is a genre-driven approach. Genre instruction involves explicitly teaching students the features of various text genres such as narrative, nonfiction, and poetry (Donovan & Smolkin, 2006). While repeated exposure to a genre appears to positively impact young students’ oral compositions (Duke & Kays, 1998; Pappas, 1991) and middle grade students’ written texts (Dressel, 1990; Eckhoff, 1983), results of studies on explicit genre instruction and

its impact on student writing are mixed. Fitzgerald and Teasley (1986) found that teaching fourth graders about the structure of narratives improved the organization and overall quality of students' stories. Corden (2007) also found that students' narrative compositions improved when teachers drew children's attention to literary devices used in narrative children's literature, discussed how the authors used these devices, and then collaboratively composed texts with students that used those literary techniques. However, a study of second and third graders' composing of science texts found that explicit instruction in science genre features correlated only with improved science procedural writing in second grade (Purcell-Gates, Duke, & Martineau, 2007). Second graders' writing of science informational texts and third graders' writing of both science informational and procedural texts remained unchanged by explicit genre instruction. Thus, the effectiveness of explicit genre instruction might differ across genres and grade levels.

In addition to a lack of evidence that explicitly teaching genre features improves student writing, Hillocks (2002) has also critiqued a genre-driven approach to writing instruction because "genres," in many schools, are narrowly defined as the standard forms that appear on writing assessments. He argues that instruction in "genres" such as compare-contrast paragraphs and five-paragraph essays has displaced opportunities for students to learn the genres authors use to tell stories, present information, and make arguments. Despite this critique, other writing educators have accepted that "on demand" writing, such as that found standardized writing tests, is an important genre for students' academic success, and they advocate explicit instruction in how to write for the genres of

testing (Gere, Christenbury, & Sassi, 2005). However, it is unclear how such instruction impacts students' scores on standardized writing assessments.

Research on Classroom Writing Instruction

While there is no large-scale data about how writing is taught in elementary schools, several smaller studies provide insight into the most prevalent instructional approaches. The most consistent finding of this research is that writing instruction varies greatly from classroom to classroom. McCarthy (2008) studied writing instruction in 29 third and fourth classrooms in four different states and found four different instructional approaches: writing workshop, integrated-curriculum, genre-driven, and packaged programs/skills. Five teachers used writing workshop, an approach consistent with process writing instruction, that included (1) student-selected writing topics, (2) a mini-lesson in which the teacher provided brief, direct instruction in a writing skill or strategy, (3) independent writing time and conferencing with peers and the teacher, and (4) instruction that focused on such topics as developing lead sentences and voice or reading-writing connections. Three teachers in the study used an integrated-curriculum approach in which they used writing throughout the school day around topics such as Native Americans and dragons. The most utilized type of writing instruction, a genre-driven approach, was apparent in 15 classrooms. Genre-driven instruction included a focus on the elements of narrative, expository, persuasive, or research writing and the use of graphic organizers for planning and organizing ideas. Although teachers using this approach provided explicit instruction, they focused on completion of tasks such as filling in a graphic organizer and transferring the information to the writing, so this approach was more consistent with Hillocks' presentation mode than with the strategy

instruction described by Graham (2006). The final approach McCarthy found, packaged programs and skills, was used by six teachers and included following a prescribed program such as Success for All (Slavin & Madden, 2001) or the basal curriculum. Instruction in these classrooms focused on teacher-directed explanations of specific skills such as sequencing, paragraphing, and mechanics, and it involved students in completing worksheets and answering question rather than writing connected text.

While McCarthy's (2008) study demonstrated the variety of instructional approaches used across classrooms, research by Lipson, et al. (2000) found that even teachers who profess to use the same approach to teaching writing often differ significantly in how they implement it. These researchers identified two distinct orientations toward writing instruction in the pedagogies of eleven fifth grade teachers who claimed to teach through a "process approach" (p. 227): curriculum-oriented and inquiry/process-oriented. Curriculum-oriented teachers focused on moving students through the phases of the writing process in a linear and prescribed fashion. All students wrote on the same topics at the same time and "practiced" (p. 210) the writing process by taking every draft through each writing stage. In contrast, inquiry/process-oriented teachers focused little attention on learning the steps of the writing process per se. Although their students did engage in planning, drafting, and revising, these teachers presented the writing process as recursive and flexible rather than formulaic.

Growing evidence suggests that high-stakes testing also impacts the type of writing instruction that occurs in elementary classrooms. In a survey of 125 fourth grade teachers in one school district, Brindley and Schneider (2002) found that the state writing test dictated teachers' instructional practices even when the teachers believed in and

preferred other teaching approaches. Hillocks (2002) found a similar impact of high-stakes testing on writing instruction in elementary, middle, and high school classrooms in Texas, New York, Oregon, Kentucky, and Illinois. Analysis of 2002 NAEP data suggests instruction across the nation has shifted from a broad conception of writing to a more narrow focus on how to answer the questions students will encounter on standardized tests (Applebee & Langer, 2006). While experienced teachers can find ways to prepare students for high-stakes tests while still maintaining more broadly conceived approaches to teaching writing (Pardo, 2006), the studies cited above indicate that the widespread use of standardized tests has impacted how writing is taught in elementary classrooms.

Despite the large variation in writing instruction across elementary classrooms, researchers generally agree that many students experience less-than-optimal opportunities to learn to write well (Troia, 2007). Ninety-seven percent of fourth graders who took the 2002 NAEP reported spending less than three hours a week on writing assignments (National Commission on Writing, 2003). When writing does occur, few assignments require sustained writing (Graham & Harris, 2005) or higher order thinking and deep interaction with academic content (Matsumura, Patthey-Chavez, Valdes, & Garnier, 2002). Teachers seldom use instructional approaches consistent with Hillocks' (1986) environmental mode or the types of activities that Sadoski et al. (1997) found most effective (Brindley & Schneider, 2002), and few use strategy instruction despite its demonstrated success (Graham, 2006). Instead, writing instruction in elementary classrooms often emphasizes grammar, mechanics, spelling, and how to structure the standard genres that appear on state tests rather than how to develop meaningful content and rhetorical effectiveness in compositions (Hillocks, 2002; Masumura et al., 2002).

These studies indicate students often improve only in the mechanics of their writing and not in their ability to communicate powerfully or effectively.

Elementary Writing Teacher Preparation

Evidence of mediocre writing instruction raises questions about elementary teachers' preparation for teaching writing. Few studies have directly examined elementary writing teacher preparation, but the small body of literature available does permit some conclusions. First, elementary teachers typically receive little guidance about how to teach writing. Many states do not require coursework in writing for elementary teacher certification (National Commission on Writing, 2003), and few elementary teachers report taking a graduate level course on writing instruction (Hillocks, 2002). Once teachers begin their careers, only a few participate in writing professional development, and those who do typically attend workshops about how to prepare students for state writing assessments (Hillocks, 2002).

Second, even teachers who receive instruction about writing pedagogy may not learn what they need to know in order to teach writing well. Although most undergraduate teacher education programs require one, perhaps two, language arts methods courses, these classes do not always provide prospective teachers with the knowledge and experiences they need to become effective writing teachers. Results from a survey at one university indicated that 64% of preservice teachers felt either ill-prepared by their teacher education program to teach writing or uncertain if they were prepared to teach writing (Bowie, 1996). These results are not surprising in light of Kennedy's (1998) finding that language arts methods courses often do not address

substantive issues related to writing instruction and focus on ideology while largely ignoring pedagogical concerns.

Other evidence that elementary teachers are unprepared to teach writing comes from teachers' own reports that their state writing assessment provides an opportunity to learn about writing instruction. A number of the teachers surveyed by Brindley and Schneider (2002) considered themselves better writing teachers because they had attended professional development about preparing students for the test. Hillocks (2002), too, found that state writing assessments function as "a kind of surrogate theory" (p. 86) about how to teach writing. Sample test responses and scoring rubrics appear to provide teachers with a model of good writing when they have no other model. Teachers' eagerness to adopt the conception of writing found on standardized tests, and the teaching practices associated with such a conception, suggests they have not had opportunities to learn about alternative approaches for teaching writing.

One learning opportunity that does seem to positively impact inservice teachers' writing instruction is professional development provided by the National Writing Project (NWP). NWP encourages teachers to discover themselves as writers, develop voice and ownership in their writing, and then apply these experiences to their teaching (Lieberman & Wood, 2003). According to surveys, interviews, and observations conducted by Fancsali and Silverstein (2002), teachers who participated in NWP Summer Writing Institutes were more likely to use exemplary practices for teaching writing and spend more time on writing than teachers who did not participate in NWP. Bratcher and Stroble (1994) also found that NWP teachers changed their practices to include increased attention to the purposes of writing, issues of voice and audience, and revision.

There is also some evidence that children in classrooms of NWP teachers improve their writing. Fancsali and Silverstein (2002) administered baseline and follow up writing prompts to students in the classrooms of 36 3rd and 4th grade NWP teachers. The children improved in their ability to construct knowledge through writing, write with organization and coherence, and control conventions in their writing. A majority of the children, including those from diverse racial and ethnic backgrounds, English language learners, and those who were free-lunch-eligible, also demonstrated increased rhetorical effectiveness—the ability to take a clear position in their writing and elaborate an argument with reasons and examples.

Despite the evidence that NWP can improve both teachers' writing instruction and their students' writing performance, only a small minority of teachers participate in NWP professional development. In a survey of 300 teachers and administrators, only 31 had attended a NWP session (Hillocks, 2002). There are currently 200 NWP sites across all 50 states (National Writing Project, n.d.), but this is a small number compared to the thousands of elementary teachers who may need further professional development in how to teach writing (National Commission on Writing, 2003).

While many elementary teachers need more high quality opportunities to learn to teach writing, it is not clear what these learning experiences should entail or at what point in teachers' development different experiences should occur. The content taught in language arts methods courses varies widely and is based on the judgments of individual teacher educators (Chambless & Bass, 1995; Colby & Stapleton, 2006; Davenport, 2006; Mahurt, 1998; Moore, 2000) because there is no empirically-derived framework of the knowledge elementary teachers use as they teach writing. Writing research has focused

on the features of effective instruction and on the social and cognitive aspects of children's writing development (Dyson & Freedman, 2003; MacArthur et al., 2006; Smagorinsky, 2006), and although this work provides some information about useful instructional practices, it offers few insights into what teachers must know to implement those practices. For example, many studies point to the potential benefits of teaching writing as a process (Pritchard & Honeycutt, 2006), but this research does not indicate what knowledge teachers use to successfully implement process writing pedagogy. What is needed is a better understanding of the knowledge that enables elementary teachers to teach writing well.

However, educators disagree about how to determine what knowledge might constitute a knowledge base for teaching writing in elementary school. Traditionally, university-based researchers have generated knowledge about teaching and assumed that the findings of their work would inform teachers' practice (Donmoyer, 1996), but reports of classroom instruction suggest academic research on writing instruction exerts only a minor influence on how teachers teach (Brindley & Schneider, 2002; Hillocks, 2002; McCarthy, 2008). While teachers themselves have produced a substantial body of knowledge about writing instruction through studying their own teaching (Fecho, Allen, Mazaros, & Inyega, 2006), they rarely undertake these inquiries for the purpose of expanding the larger community's knowledge base (Richardson, 1994), so there is no large scale mechanism for disseminating, verifying, and extending the results of their work.

In light of these shortcomings, several researchers (Chokshi & Fernandez, 2005; Hiebert et al., 2002; Lewis, Perry, & Murata, 2006; Stigler & Hiebert, 1999) have

proposed lesson study, a form a collaborative teacher research, as a means of generating teaching knowledge that is both useful to teachers and open to collegial critique and improvement. However, research on U.S.-based lesson study has examined teachers' experiences participating in the lesson study process rather than the professional knowledge that the process generates (Fernandez, 2005; Hurd & Licciardo-Musso, 2005; Rock & Wilson, 2005). This study will address that gap by examining the knowledge about writing instruction produced by elementary school teachers who participate in lesson study.

Purpose of the Study

The purpose of this study was to examine the content and nature of the knowledge about writing instruction that elementary teachers generated through a lesson study cycle (Lewis & Tsuchida, 1998). By describing the knowledge teachers produced and theorizing how that knowledge may be useful to others, this study contributes to current discussions of lesson study as a mechanism for generating a knowledge base for teaching. As will be further discussed in chapter six, the content of the knowledge refers to the substance of the ideas generated, while the nature of the knowledge refers to the ideas' character. This study examines both the substance and character of the ideas produced by four elementary lesson study groups.

Because the knowledge produced during lesson study depends upon the people and processes through which it is generated, this study sought to understand both the knowledge that emerges from lesson study and the systems that produce that knowledge. As elaborated in chapter two, I drew upon complexity theory (Cilliers, 2002; Davis & Sumara, 2006) to conceptualize the lesson study participants, the processes that they

undertook, and the ideas and artifacts that supported their work as complex systems through which knowledge about teaching writing emerged. The study explored the following questions:

- How did the lesson study systems enable and constrain the knowledge about writing instruction that emerged through them?
- What is the nature and content of the knowledge about writing instruction that emerged through the lesson study systems?

Definition of Terms

Several terms are used throughout the study in ways that may differ from how they are used in other studies or other contexts. *Knowledge*, in this study, refers to a true, justified belief (Fenstermacher, 1994), and in chapter two I describe the criteria for what constitutes “truth” and “justification.” I use the term *knowledge* to refer to ideas shared among the lesson study group members and to refer to ideas held by individual teachers.

The term *knowledge base* refers to collective knowledge that is shared among members of the teaching profession and agreed upon by those members (Galluzzo, 1999). Knowledge from the knowledge base is deliberately and proactively passed on from one generation of educators to another. As a result, the knowledge base can inform what is taught in preservice teacher education courses and in inservice teacher professional development.

The term *knowledge of content* refers to the substance, subject matter, or topic of the knowledge the lesson study groups generated. It is the “what” of the ideas that emerged through the lesson study process. The *nature of knowledge* is the character, type,

or kind of knowledge produced by the groups. It describes the features of the knowledge that emerged through lesson study.

Organization of the Dissertation

Chapter Two – Literature Review follows this introduction. In this chapter, I discuss the three bodies of literature that inform this study. First, I review research on the knowledge base for teaching by examining and critiquing the empirical findings and the epistemological underpinnings of the work. Second, I review the literature on lesson study, how it might contribute to the knowledge base for teaching, and the challenges and potential benefits of conducting lesson study in the United States context. Third, drawing on complexity theory, sociology of knowledge, and traditional epistemology, I outline the theoretical framework of knowledge production that guides this study. Finally, I draw together all three bodies of literature by theorizing how lesson study might serve as a process that produces knowledge for the knowledge base for teaching.

Chapter Three – Research Design describes the qualitative methods and procedures through which I conducted the study. I explain the overarching study design, how I recruited and interacted with participants, the data collection procedures, and how I conducted the data analysis. Throughout, I describe how the theoretical framework influenced the research design and the rationales for each design decision. I also describe how and why I conceptualized the lesson study groups as knowledge producing systems. The chapter concludes with a discussion of the study's limitations.

Chapter Four – The Lesson Study Systems details how the lesson study groups operated. I first describe the participating schools and the district in which they were located, including demographic information, the writing curriculum, and teachers'

perceptions of the curriculum. I then describe the elements of each lesson study system: the lesson study process, the available ideas and artifacts, and the lesson study participants. I also provide a detailed, chronological account of what occurred in each lesson study group during the study.

Chapter Five – Knowledge Generation Within the Lesson Study Systems examines the first research question, “How did the lesson study systems enable and constrain the knowledge about writing instruction that emerged?” It explains how the elements of the lesson study systems interacted to generate knowledge about teaching writing. I analyze how instances of over constraint, under constraint, and enabling constraint led to knowledge that was less and more useful to the knowledge base for teaching writing.

Chapter Six – Knowledge From the Lesson Study Systems examines the second research question, “What is the nature and content of the knowledge about writing instruction that emerged through the lesson study systems?” In this chapter, I describe the characteristics of the knowledge generated by the lesson study groups along five continua that emerged from the data analysis. Then, I present four categories that describe the content of the knowledge the groups produced, and I provide examples of knowledge in each category.

Chapter Seven – Discussion, Conclusions, and Implications explores whether the ideas generated by the lesson study groups can be considered knowledge appropriate for the professional knowledge base for teaching writing. I compare the knowledge that emerged from the lesson study systems to the definition of knowledge developed in chapter two and to the criteria for professional knowledge set forth by lesson study proponents. I then discuss the study’s implications for using lesson study as mechanism

for generating a knowledge base. Finally, the chapter concludes with an examination of directions for future research.

Chapter Two – Literature Review

This chapter reviews three bodies of literature that inform this study: the knowledge base for teaching, lesson study, and theories of knowledge production. First, I review and critique different attempts to identify the knowledge that constitutes the knowledge base. This review makes clear many challenges exist in generating a knowledge base, and some researchers propose lesson study as a means to overcome these difficulties. Thus, in the second section of this chapter, I review the lesson study literature. I detail the lesson study process, its possible role in generating a knowledge base, and the challenges and potential benefits of implementing this Japanese practice in the U.S. context. Because lesson study groups function as systems that generate knowledge, in the third section of this chapter, I review literature on knowledge producing systems. I draw on complexity theory, sociology of knowledge, and traditional epistemology to theorize knowledge as emerging from systems of people, processes, artifacts, and ideas rather than from any single entity. I also develop a definition of knowledge to guide this study and then describe how, in light of this theoretical framing, the lesson study process generates knowledge about teaching.

Knowledge (Base) For Teaching

Identifying the knowledge needed for teaching has been a central concern of educational scholars since research on teaching began (Donmoyer, 1996; Galluzzo, 1999). Over the years, various groups, including the American Association of Colleges for Teacher Education (AACTE) and the National Academy of Education (NAE), have attempted to codify the findings of educational research into “knowledge bases” that

outline the knowledge needed for teaching (Darling-Hammond, Bransford, LePage, Hammerness, & Duffy, 2005; Murray, 1996; Reynolds, 1989; Snow, Griffin, & Burns, 2005). However, these efforts have been critiqued because “knowledge needed for teaching” is neither a straightforward nor singular idea. The phrase itself raises the question: Knowledge needed for *what kind of* teaching? Given that educators disagree about the purposes and goals of education (Galluzzo, 1999), as well as the teaching practices that follow from those purposes, outlining an uncontested knowledge base for teaching has proven challenging.

One tension in formulating a knowledge base is that any knowledge about teaching is inherently value-laden and guided by ideology. Galluzzo (1999) noted teacher educators typically rely on philosophical stance as much as on research findings when articulating a knowledge base for teacher education programs. This fact is unsurprising in light of Donmoyer’s (1996) argument that all knowledge reflects “a politics of perceptions” that is “deeply embedded in culture and culturally sanctioned categories and conduct...” (p. 99). As a result, he contends, any knowledge base will serve the interests of one group over another and can therefore be viewed as political. Indeed, Whitcomb’s (2003) chronological survey of attempts to formulate a knowledge base indicated that approaches to knowledge for teaching inevitably reflect scholars’ policy contexts, their purposes, and their audiences.

Despite the inherently ideological and political nature of a knowledge base for teaching, such a knowledge base is thought by many to be necessary to develop teaching as a profession and to guide the work of teacher educators (Galluzzo, 1999; Murray, 1996). Attempts to identify the knowledge needed for teaching have addressed a number

of different questions, including *What is known about effective teaching? What do teachers know? What knowledge is essential for teaching?* and *Who produces knowledge about teaching?* (Fenstermacher, 1994). Each of these lines of research offers a different and potentially useful pathway to understanding teaching knowledge, and each has contributed either directly to efforts to formulate a knowledge base for teaching or to theories of such a knowledge base (Verloop, van Driel, & Meijer, 2001; Whitcomb, 2003). In the sections that follow, I briefly describe each of these research strands and critique how each approach has been used to build a knowledge base for teaching. I then argue that, given the limitations of these approaches, lesson study might prove a useful as a mechanism for generating a knowledge base.

Research on Effective Teaching

Research on effective teaching encompasses a wide variety of studies that cut across the process-product literature, research on teacher cognition, and studies of teacher professional development and learning to teach (Fenstermacher, 1994). This work identifies effective instructional practices, and the findings have been used to map out the content of what teachers should know (Murray, 1996; Reynolds, 1989). Most recently, efforts to create a knowledge base through research on effective teaching have taken a “best practices” approach in which researchers investigate the types of instruction that help children learn, and then the knowledge and skills needed to implement that instruction become the knowledge base for teaching. A prominent example of best practices as a knowledge base is the work of the NAE’s Committee on Teacher Education. This committee compiled research on effective teaching practices into two books, *Preparing Teachers for a Changing World: What Teachers Should Learn and Be*

Able to Do (Darling-Hammond et al., 2005) and *Knowledge to Support the Teaching of Reading* (Snow et al., 2005), which outline a knowledge base for teacher education.

Identifying the knowledge base through research on effective teaching is problematic for several reasons. First, formulating a knowledge base around the findings of this research requires consensus about what constitutes “effective teaching.” Such consensus is difficult to achieve when educators do not agree upon the purposes of education (Galluzzo, 1999) because teaching effectiveness must be measured against how well instruction accomplishes its purposes. Furthermore, many researchers have argued that instruction based on best practice research does not meet the needs of children who live in poverty, those who are from minority cultures, or those who are English language learners (Gee, 1999; Grant, Wong, & Osterling, 2007; Gutierrez et al., 2002; Reyhner & Hurtado, 2008). Thus, any knowledge base based on effective teaching research is open to critique from those who contest the findings of that research.

Formulating a knowledge base for teaching from effective teaching research has also been criticized because it treats teachers, their perceptions, and their ways of knowing as irrelevant to the knowledge base (Schon, 1983). Research on effective teaching conceives of knowledge for teaching as a set of technical knowledge and skills and therefore does not account for the complexities of what teachers must know to accomplish their work. In addition, any knowledge base based on effective teaching research will be incomplete because this work only considers the knowledge required to implement a set of prescriptive teaching methods rather than the knowledge teachers draw upon to confront novel or non-instructional situations in their classrooms.

Research on Teachers' Knowledge

Researchers have also investigated the knowledge needed for teaching by investigating what teachers know. This body of work is so extensive that several general (Calderhead, 1996; Carter, 1990; Munby, Russell, & Martin, 2001; Tom & Valli, 1990) and subject-specific (Ball, Lubienski, & Mewborn, 2001; Grossman, 2001; van Driel, Verloop, & de Vos, 1998; Wilson, 2001) reviews have been written to summarize and synthesize the findings. These reviews reveal that researchers conceptualize teachers' knowledge in a variety of ways and have investigated such constructs as personal practical knowledge, pedagogical content knowledge, subject matter knowledge, knowing-in-action, practical reasoning, classroom knowledge, and craft knowledge. One reason for the many different conceptions of teacher knowledge is disagreement about the nature of practitioner knowledge and what might "count" as professional knowledge for teaching (Munby et al., 2001). For example, some researchers have focused on documenting teachers' understanding of established disciplinary knowledge (Ball et al., 2001), while others have examined what Brown and McIntyre (1993) describe as "professional knowledge which teachers use in their day-to-day classroom teaching, knowledge which is not generally made explicit by teachers and which teachers are not likely always to be conscious of using" (p. 19). The various knowledge constructs overlap, shift, and diverge in complex ways (Munby et al., 2001), and the distinctions made between various constructs assume dichotomies that some teacher educators reject (Davis & Simmt, 2006).

One critique of teacher knowledge research is that it has tended to conceptualize knowledge for teaching in terms of propositional knowledge, either "knowing that" or

“knowing how.” Many theorists advocate conceiving of teaching knowledge in different terms. Some researchers argue that teachers’ knowledge includes the ability to exercise good judgment in relation to their practice (Coulter & Wiens, 2002) and the ability to reason in ways unique to teaching (Donmoyer, 1996; Fenstermacher, 1994; Schon, 1983). Feldman (1997) describes teaching as “a way of being” (p. 757) and suggests wisdom-in-practice is a form of knowledge that “is constituted of [the teacher’s] intentions and her interactions with students as she moves from group to group, looking, listening, and questioning as she comes to understand better the nature of group work, hands-on science activities, and discovery learning” (p. 770). Wisdom-in-practice is thus an embodied form of knowing that happens in the moment of teaching. Korthagen and Kessels (1999) similarly describe teachers’ knowledge in terms of “unity of perception, interpretation, and action” (p. 8). Thus, identifying a knowledge base for teaching from research on teacher knowledge proves challenging because it unclear how to conceptualize the knowledge that should make up that knowledge base.

Research on teachers’ knowledge locates the knowledge base for teaching within teachers themselves, a move that acknowledges the value and validity of what teachers know and how they know it. Yet, as Ball and her colleagues (Ball et al., 2001) point out, what teachers know and what they *should* know in order to teach well are not necessarily the same. Studying teachers’ knowledge as a means of formulating a knowledge base for teaching assumes teachers possess the knowledge needed to teach well. This may or may not be an accurate assumption. Most researchers study “experienced” (Davis & Simmt, 2006; Gess-Newsome & Lederman, 1995), “exemplary” (Barnett & Hodson, 2001; Langer, 2001), or “expert” (Leinhardt & Smith, 1985) teachers in an effort to ensure that

the research identifies knowledge important to teaching. However, even beyond the challenges of identifying who qualifies as an experienced, exemplary, or expert teacher (Berliner, 2004), it is possible the teachers participating in these studies may not possess the knowledge that should constitute the knowledge base.

Research on Essential Teaching Knowledge

A third approach taken toward identifying a knowledge base for teaching is to examine what knowledge might be deemed “essential” to the task of teaching. A prominent example of this research is the work of Shulman and his colleagues (Shulman, 1987; Wilson, Shulman, & Richert, 1987), who developed arguably the most influential model of essential teaching knowledge. They identified seven categories of knowledge that constitute the professional knowledge base: content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, and knowledge of educational ends. Several other teacher educators have developed similar frameworks that consist of knowledge categories that overlap with Shulman’s (Barnett & Hodson, 2001; Elbaz, 1983; Grossman, 1990; Turner-Bisset, 1999).

While models of essential teaching knowledge offer potentially useful frames for conceptualizing the knowledge needed for teaching, they do not, in and of themselves, fully specify a knowledge base because they do not include the content of the knowledge essential for teaching. This line of research also implies that teachers hold their knowledge in differentiated categories. While some frameworks include overlapping categories, such as content knowledge and general pedagogical knowledge forming a hybrid “pedagogical content knowledge” in Shulman’s (1987) framework, Ball (1988)

and Davis and Simmt (2006) contend that the various types of knowledge held by teachers intertwine and interact in complex ways. Given such intertwining and interaction, a construct like “pedagogical-content-curriculum-learner-context knowledge” might be a more appropriate representation of the knowledge used by teachers. As with research on teachers’ knowledge, lack of clarity about the nature of teaching knowledge hinders attempts to conceptualize the knowledge needed for teaching.

Who Produces Knowledge About Teaching?

One challenge of identifying a knowledge base is deciding who should determine what knowledge is important and useful for teachers. Historically, university researchers have generated knowledge about teaching and then disseminated it to teachers to apply in their classrooms (Donmoyer, 1996). However, many educators contest this practice (Cochran-Smith & Lytle, 1990, 1992; Doyle, 1997; Schon, 1983), arguing that it excludes from the knowledge base the knowledge that teachers have gained through their day-to-day teaching experience. In fact, Schon asserts that knowledge generated by university researchers may be irrelevant to teachers because it does not transfer from the “high, hard ground” (p. 42) of academia to the “swampy lowland” (p. 42) of the classroom.

Schon’s (1983) argument is well founded if we view knowledge as generated through particular, rather than generic, structures (Bourdieu, 2004). As Hiebert, et al. (2002) point out,

the [academic] research community has worked toward the goal of building a professional knowledge base and has developed an infrastructure for recording, sharing, and accumulating knowledge. But the problems framed and the methods

preferred have produced knowledge represented in forms that make it difficult for teachers to use. (p. 12)

In order to resolve this situation, researchers such as Schon and Cochran-Smith and Lytle (1992) propose that educators “redefine the notion of a knowledge base” (Cochran-Smith & Lytle, 1992, p. xiv) based on research teachers conduct in their own classrooms.

However, formulating a knowledge base for teaching through teacher research is challenging because, unlike university-based research, no standard measures of quality exist for teacher research (Whitehead & McNiff, 2006). In addition, there is currently no mechanism for systematically disseminating, evaluating, or extending the results of this work (Hiebert et al., 2002).

Hiebert and colleagues (2002) agree with Schon (1983) that teacher knowledge can, and should, form a basis of a knowledge base for teaching, but they believe that knowledge must be transformed before it can function as a professional knowledge base. They contend that teacher knowledge has three distinct features: (1) it is linked with practice, (2) it is detailed, concrete, and specific, and (3) it is integrated around the concerns of practice. While these attributes make teacher knowledge valuable and useful in practice, it lacks some of the features necessary for constituting a professional knowledge base. Hiebert et al. contend that for knowledge to be considered professional rather than personal, it must be made public, be represented in a storable and sharable form, and possess a mechanism for verifying and improving that knowledge. They propose lesson study as a means of transforming practitioner knowledge into a professional knowledge base for teaching.

Given the critiques, outlined above, of using research on effective teaching, research on teachers' knowledge, and research on essential teaching knowledge as the foundation of a knowledge base for teaching, it may be useful to also include knowledge generated by teachers in the knowledge base. Several researchers (Chokshi & Fernandez, 2005; Lewis, Perry, & Murata, 2006) in addition to Hiebert et al. (2002) suggest that the knowledge teachers produce during lesson study can form the basis of the professional knowledge base. However, no research has examined the knowledge that emerges from the lesson study process, so it is unclear if lesson study generates knowledge appropriate for a knowledge base for teaching. To shed light on this question, in the next section I review the lesson study process and its benefits and challenges, particularly in a U.S. context. Throughout the section, I examine how lesson study might contribute to the development of a professional knowledge base.

Lesson Study

Lesson study, a form of collaborative teacher research that originated in Japan, involves groups of teachers in planning, implementing, evaluating, and revising instruction (Fernandez, 2002; Stigler & Hiebert, 1999). Although lesson study varies somewhat across settings (Lewis, Perry, & Murata, 2006), the process generally includes four phases. During phase one, the lesson study group develops goals for student learning and identifies a curricular topic through which they want to address those goals. The teachers then examine published reports about how students learn the concepts related to that topic, how other teachers have taught the topic, and teaching ideas recommended by researchers.

Based on their reading, the teachers jointly design a “research lesson” (Lewis, Perry, & Murata, 2006, p. 3) during phase two of lesson study. They create a detailed, written lesson plan of the teaching that they believe will best impact student learning, often using lessons from the curriculum as a starting point. During phase three, one teacher teaches the research lesson to her students while the others observe and take notes about how students react to the lesson and what they do or do not learn. In the fourth phase of lesson study, the teachers share and analyze the data they collected during the research lesson and, if needed, redesign the instruction to improve it. Another member of the group then teaches the revised lesson to her class as the others observe. This plan-teach-evaluate-revise cycle continues until the teachers are satisfied that the lesson effectively accomplishes the teaching objectives. At the end of the lesson study process, the groups prepare reports that document the work they carried out and the insights they gained about teaching through the experience (Fernandez, 2002).

Lesson study offers a potentially valuable means of generating knowledge about teaching because it overcomes some of the challenges associated with developing a knowledge base. First, lesson study produces knowledge that is immediately useful to the teachers participating in lesson study (Hiebert et al., 2002). Lesson study allows teachers to frame questions about teaching in ways that can be meaningful for other practitioners and to generate knowledge within a context that responds to the day-to-day demands of the classroom. In addition, the process used to produce this knowledge—planning, teaching, gathering data on student learning, and evaluating the effectiveness of the teaching—corresponds to teachers’ daily work and therefore generates a knowledge base grounded in the activities of their daily practice. The close relationship between

lesson study and the practice of teaching increases the likelihood teachers will find the knowledge gleaned through lesson study useful and meaningful.

Second, lesson study generates knowledge that is open to collegial critique and improvement (Chokshi & Fernandez, 2005; Lewis, Perry, & Murata, 2006). Unlike some forms of teacher research, lesson study provides ongoing opportunities for peer critique of the knowledge that emerges through the process. Critique is built into the lesson study process because as teachers collaboratively design and evaluate the research lessons, they can engage in rigorous discussion and critical evaluation of the teaching strategies they place in the lesson plan. Once the lesson has been taught, teachers evaluate its effectiveness and redesign it to make improvements that will increase student learning. In addition, because the lesson plan itself documents the knowledge generated by the lesson study group, it can be shared with other educators who can further critique and improve the knowledge used in the lesson.

Lesson study also offers a unique and potentially useful form through which to articulate knowledge for teaching. The lesson study process yields a lesson plan and an elaborated report that represent teaching knowledge in an integrated form rather than as a series of propositional statements. Hiebert et al. (2002) describe the knowledge generated through lesson study as “theories with examples” (p. 7), capable of representing both abstract and concrete knowledge about teaching. Because the lesson plan captures teachers’ knowledge in the form in which it is used, it can potentially document whatever types of knowledge teachers may have—whether it is craft knowledge, subject matter knowledge, pedagogical content knowledge, or some other type of knowledge. This removes the need to conceptualize in advance what the nature

of teacher knowledge might be. The lesson plan and lesson study report also communicate the knowledge generated through lesson study in a form that is meaningful for the practitioners who will use it. The close relationship between the artifacts produced in lesson study and the artifacts teachers use during their actual practice may increase the usefulness of the knowledge generated.

Although lesson study holds potential as a means of identifying knowledge that might constitute a knowledge base for teaching, research on lesson study in the United States has focused exclusively on how the lesson study process affects teachers and their instruction rather than on the professional knowledge generated by lesson study groups (Byrum, Jarrell, & Munoz, 2002; Fernandez, 2002; Hurd & Licciardo-Musso, 2005; Lewis, Perry, & Murata, 2006; Rock & Wilson, 2005). This gap in the research hinders our understanding of lesson study's usefulness as a means for expanding and improving the knowledge base for teaching. For example, while the lessons plans created through lesson study may capture the integrated knowledge used by teachers, no one has examined the content or nature of this knowledge. If we hope to build a knowledge base through lesson study, we need to understand the type of knowledge lesson study produces and determine how it can, or perhaps cannot, inform both the work of teachers and the content taught in teacher preparation courses.

The Lesson Study Process

Despite enthusiasm for lesson study from both researchers and teachers in the U.S. (Hiebert et al., 2002; Hurd & Licciardo-Musso, 2005; Takahashi & Yoshida, 2004), it is challenging to know how lesson study groups should operate because there are few published examples of their work (Lewis, Perry, & Murata, 2006). A handful of

researchers have begun to systematically document how American teachers engage in lesson study, but at the present time this work consists of only a few cases (Fernandez, 2002, 2005; Fernandez, Cannon, & Chokshi, 2003; Hurd & Licciardo-Musso, 2005; Lewis, 2002; Mills College Lesson Study Group, 2006; Puchner & Taylor, 2006), none of which describe the process in its entirety. Fernandez and Yoshida (2004) provide the most detailed and comprehensive account of a lesson study group, documenting one entire school year of lesson study conducted by elementary school teachers in Japan. In the following sections, I draw on this example, and to a lesser extent on the briefer examples of U.S. lesson study groups, to describe the lesson study process in detail.

Although lesson study typically follows the four phases outlined in the previous section, variations exist in how different groups of teachers conduct lesson study work. In Japan, where lesson study originated and where teachers engage in the process many times over the course of their careers (Fernandez & Yoshida, 2004), lesson study has evolved across tens of thousands of sites to encompass different goals, practices, norms, scheduling, and governance (Lewis, Perry, & Murata, 2006). However, because the lesson study process at most of these sites is undocumented, it is impossible to describe the full range of variations that occur. The description of lesson study provided here is based on the examples available in the literature and will note how the process varies across these examples.

Planning the research lesson. Teachers begin lesson study by discussing and selecting a research theme or goal. Two questions guide this discussion: (1) Ideally, what qualities will students have when they graduate from our school? and (2) What are the actual qualities of our students now? (Lewis, 2002, p. 56). By comparing their ideal and

actual student qualities, teachers identify a gap that becomes the focus of their lesson study. In Japan, teachers typically examine their school mission statement to determine the characteristics they want to foster in their students, so the lesson study goal focuses on broad dispositions that are relevant to all grade levels and content areas rather than on specific academic skills (Fernandez & Yoshida, 2004). Examples of lesson study goals include *Developing lessons that encourage students to learn from each other* (Fernandez & Yoshida, 2004, p. 12); *Fostering curious and inquisitive students* (Fernandez & Yoshida, 2004, p. 10); and *For students to develop fundamental academic skills that will guarantee their advancement and a rich sensibility about human rights* (Lewis, 2002, p. 57). Because lesson study goals are broad, schools usually pursue the same goal for several consecutive years, though each lesson study group may explore the goal through different research lessons in different content areas.

Once teachers have identified a research goal, they form subgroups to plan the research lessons. These subgroups usually include teachers from the same or adjacent grade levels (Fernandez & Yoshida, 2004). Each group chooses a content area around which to focus its research lesson and identifies goals specific to the lesson. Lewis (2002) describes four levels of lesson study goals: long-term goals that are related to the school's research theme, broad subject matter goals for the content area under study, goals specific to the unit of study, and goals specific to the research lesson. While the long-term goal is often developed collectively by all of the teachers in the school, each lesson study group is responsible for developing the other goals as they relate to its research lesson. In Japan, long-term, subject matter, unit, and lesson goals are located in the national *Course of Study*, so goal development is relatively straightforward (Lewis, 2002). In the U.S.,

teachers have used state standards, textbooks, and ideas from professional books to guide their goal setting (Hurd & Licciardo-Musso, 2005; Lewis, Perry, Hurd, & O'Connell, 2006). However, it is unclear how multilevel goal development ideally occurs because the literature provides no examples of a lesson study group setting and aligning goals across all four levels.

After the lesson study group sets its goals, teachers begin to plan the research lesson itself. Lewis (2002) suggests teachers begin planning by examining “the best existing lessons” (p. 62) on the topic they will teach. Japanese teachers gather lesson examples from a variety of sources including textbooks, published lesson study reports, books and videos published by teachers, and their own observations of research lessons at other schools. While most of these resources are unavailable to teachers in the U.S., Lewis suggests that lesson study groups contact university professors, museums, and professional organizations, as well as local teachers who have excellent reputations, to ask for curriculum resources. The lesson study group then adapts ideas from these best existing lessons as it plans its own research lesson.

The heart of the lesson study process is the meticulous development of a detailed lesson that accomplishes the goals set forth by the lesson study group. Teachers typically spend several sessions discussing and planning their research lesson, carefully considering how each aspect of the lesson will impact student learning. The lesson study group described by Fernandez and Yoshida (2004) had extensive discussions about which subtraction problem should open the lesson, what type of manipulatives students should use, how to best encourage students to discuss the ideas they used to solve problems, and

how to conclude the lesson in the most meaningful way. The teachers discussed each aspect of the lesson in detail, debating how to best accomplish the goals they had set.

Rich discussion about teaching, learning, and the rationales behind instructional decisions is one of the hallmarks of lesson study. The following excerpt, taken from Fernandez and Yoshida's (2004, p. 61-62) description of a Japanese lesson study group, exemplifies the type of discussion that occurs during lesson study:

T1: If we can come up with a manipulative that consists of the group of numbers that add up to the number 10 and two ones, the students would somehow try to subtract 5 from 12. I wonder if there is such a manipulative close at hand.

T2: If we are talking about something close at hand, the egg carton is one I can think of.

T3: Yeah, yeah, a carton for 10 eggs. [Eggs come in cartons of 10 in Japan.]

T1: I think something like the egg carton makes more sense to use for this problem. Ginkgo leaves are in pieces in terms of the organization of the number 12. They are not like the group of numbers that add up to the number 10 and two ones. If we want to get solutions like the subtraction-addition method and the subtraction-subtraction method, I think it is better to use a manipulative like the egg carton. If we use materials like ginkgo leaves, the students would come up with the counting-subtraction method because they are in pieces. What would be a good manipulative that satisfies the condition of a bunch of ten?

T3: Yes, but we need to think if it is OK for us to fix the organization of numbers as a bunch of ten and two ones. Think about it. If the number 12 is represented in pieces, the students can think of the number 12 as 10 and 2 and 12 all together, etcetera.

T4: Yeah, they can line them up in one line.

T3: Yeah, that is one way, also they can organize the number as 5, 5, and 2. Thus, we need to think about whether or not to narrow how the number is represented. Yes, our goal is not confuse the students, but to see how the students think or their ideas. I wonder whether we should narrow how the number is represented. I think it is OK to narrow things sometimes, but I think that in this case it is better to give some choices for the students to choose the manipulatives they want in order to solve the problem on their own.

As this excerpt demonstrates, lesson study engages teachers in in-depth discussions about the relationships between instructional approaches and student learning. The teachers in this lesson study group pondered how using various types of manipulatives would impact students' understanding. They analyzed the benefits and drawbacks of each approach, considered how students would respond to different manipulatives, and discussed which method would best encourage the type of student thinking they wanted to facilitate.

Through their discussion, teachers generate a research lesson and document it in detail. They typically write the plan within a four column chart that includes (1) the learning activities that will occur and the questions the teacher will ask at each point in the lesson; (2) the expected student reactions, including the ideas the students will likely generate and what they will likely say or do; (3) the teacher's response to the anticipated student reactions and important things for the teacher to remember at each point in the lesson; and (4) how the lesson study group will evaluate the success of each step of the lesson. Creating such an extensive and detailed plan is, according to many teachers and administrators, the key to successful lesson study (Fernandez & Yoshida, 2004).

Specifying the details of the lesson serves several important purposes. First, it provides an opportunity for teachers' deep reflection on student learning and how instruction facilitates learning. It also enables efficient, in depth, and focused discussion during lesson study planning sessions. In addition, it helps to allay the nervousness of the teacher who will be teaching the research lesson because every element, including possible student responses, had been mapped out beforehand. Finally, a detailed plan helps teachers to make better use of student comments during the lesson. Because possible

student responses are generated during planning, teachers are prepared to use students' ideas to lead them to desired goals of the lesson.

In addition to planning the lesson and anticipating students' responses, the lesson study group also specifies what observers should note and evaluate. For example, the teachers in Fernandez and Yoshida's (2004) study identified 15 points within the lesson at which they wanted observers to look for evidence of student understanding. In the evaluation column of the lesson plan, they included questions such as *Were the students able to fill in the blanks with appropriate numbers and think about the problems?* and *Could the student construct the right expression?* These questions prompt observers to gather evidence about whether the lesson met the goals set by the lesson study group.

Although most lesson study reports follow a similar format and include similar elements, lesson study groups do revise reports to meet their needs. For example, the teachers described by Fernandez and Yoshida (2004) initially wrote their lesson plan with a section entitled *Perspectives on Evaluation* in which they listed the different dimensions of student learning they wanted to evaluate during the lesson. However, as they planned the lesson and defined its objectives, they realized that it made sense to evaluate the lesson based on the goals for student learning. They deleted the *Perspectives on Evaluation* section and created a new section called *Goals of the Lesson*.

Teaching the research lesson. Once the research lesson is planned, one teacher in the lesson study group volunteers to teach it to her class while the other group members observe. In Japan, all teachers and administrators in the school, as well as teachers from other schools, commonly attend the research lesson (Fernandez & Yoshida, 2004). This practice is possible because students work alone in their classrooms while

school personnel observe the lesson in a different classroom. In the U.S., where leaving children alone in the classroom is generally unacceptable, schools must hire substitute teachers (Hurd & Licciardo-Musso, 2005) or shuffle their staff to supervise classes so teachers can attend the research lesson. This added difficulty means that American teachers typically attend research lessons only if they are members of the lesson study group.

During the research lesson, observers gather information about the things students do and say as the lesson progresses. The goal during this component of the lesson study process is to collect as much concrete evidence as possible about the student learning that occurs as the lesson is taught (Fernandez et al., 2003). Observers act as extra pairs of eyes as the lesson unfolds, taking copious notes and thoroughly documenting student reactions. In order to ensure that the research lesson is conducted under typical classroom conditions, observers do not assist students or the teacher during the lesson, but instead, focus on collecting evidence about the lesson's effectiveness. In addition, the observers record how much time each part of the lesson takes.

Observers may have copies of the lesson plan on which they take notes or they may desire to "experience the lesson as students do" (Lewis, 2006, p. 4), without advance knowledge of how it will unfold. Whether or not they use the lesson plan document created by the lesson study group, observers gather evidence about aspects of the lesson that the group specified in advance. These questions focus the observers' attention to the particular aspects of the lesson that the group intends to evaluate.

Reflecting on the research lesson. Following the research lesson, the lesson study group reconvenes to review its observation notes and discuss how the lesson could

be improved. In Japan, most groups used established protocols for discussing and analyzing their research lessons (Lewis, 2002). The teacher who taught the lesson typically speaks first, pointing out any difficulties she experienced. Then, the observers talk about the data they collected during each section of the lesson. Because the research lesson belongs to the entire lesson study group, not just to the teacher who taught it, all group members take responsibility for the lesson plan and the thinking behind it. This group ownership prevents the discussion from becoming a critique of the teacher who taught the lesson. The conversation focuses not on the lesson implementation, but on the data collected by the observers. Observers talk specifically about what they saw students do and say rather than about their impressions of the lesson. Free discussion time is limited so that the conversation will stay on topic and avoid digressions.

Like the discussions that occur during the planning phase, reflection on the research lesson engages teachers in in-depth conversation about teaching and learning. The teachers in Fernandez and Yoshida's (2004) study discussed the lesson length, the handout students were given, students' misunderstanding of the opening problem, how students used the lesson manipulatives, and the wording of key questions asked by the teacher. Through this discussion, they grappled with issues such as why the lesson extended beyond the time allotted, why the handout proved confusing for students, why the manipulatives were ineffective, and how to re-word key questions. As a result of their conversation, the teachers decided to shorten several sections of the lesson, leave student work on the board so the children could refer to it, and redesign portions of the student handout. They also engaged in a lengthy discussion about how to redesign the manipulatives to encourage more productive thinking about regrouping.

As teachers reflect on the research lesson, they typically move back into the planning phase and redesign the lesson based on their discussion. Once the new lesson is complete, a different member of the group volunteers to teach it to her class, and the lesson study cycle repeats. Teachers attend the new research lesson and record their observations, and the lesson study group reflects on the new data that were collected. This reteaching of the lesson allows teachers to observe the impact of their lesson revisions. In theory, teachers may refine, teach, and evaluate the lesson as many times as they desire, but revising a lesson too many times diminishes the richness and quality of the discussions that occur (Chokshi & Fernandez, 2004). Most of the lesson study groups described in the literature revised and re-taught their lesson one time (Fernandez & Yoshida, 2004; Lewis, 2002).

Writing a report of the research lesson. An important aspect of the lesson study process is documenting what occurs. Teachers ideally take detailed notes during the lesson study planning sessions, recording the decisions they make about instruction and their rationales for those decisions. These notes, as well as the working drafts of the research lesson, form the lesson study report (Chokshi & Fernandez, 2004). Lewis et al. (2006) suggest that, in addition to these items, teachers also create a summary of their learning at the end of the lesson study process.

The written lesson plan created during lesson study is a “complex and meaty document” (Fernandez & Yoshida, 2004, p. 35) that details information about the lesson, the context in which it is taught, and the thinking that guided the lesson study group’s work. The introductory section typically contains several paragraphs of background information, including a description of the students and their current knowledge and

interests, a description of why the lesson is important for students' growth, and an explanation of the teaching approaches used in the lesson. It also provides information about the unit to which the study lesson belongs. Teachers list the unit's goals and describe how the unit is related to the instruction that students receive in prior and subsequent grades. They also include a list of the lessons that comprise the unit and an explanation of how the study lesson's content fits within the unit sequence. These sections of the lesson plan contextualize the study lesson and provide insight into the thinking and rationales that guided the lesson's development.

The next and most detailed section of the lesson plan describes the lesson itself. The section begins with an explanation of the lesson goals. For example, the lesson study group Fernandez and Yoshida (2004) documented included goals for students' interests and attitudes, their ways of thinking, their processing of concepts, and their knowledge and skills. On the *interest/attitude dimension*, the teachers wanted their students to progress in calculating subtraction using concrete objects and in their attempts to present their ideas. On the *ways of thinking dimension*, they wanted students to increase their ability to solve problem using previously learned concepts and the idea of breaking numbers into tens when regrouping. The goal of the *processing of concepts dimension* was that students would be able to calculate 12 minus 7, while the goal of the *knowledge/skills dimension* was that students would understand the meaning and method of calculating 12 minus 7.

Following the explanation of the goals is a "blow by blow" (Fernandez & Yoshida, 2004, p. 45) account of what occurred during the lesson. Often, this section of the report consists of the four-column lesson plan that the teachers prepared during the

planning phase. If the lesson study group revised and re-taught the lesson, both the original and modified plans are included in the report as well as an explanation of why particular changes were made. This account of the lesson and its revision allows teachers to communicate their teaching and their thinking about the lesson to others outside their school.

The lesson study report evolves as the lesson study group operates. In Fernandez and Yoshida's (2004) study, the teacher who volunteered to teach the research lesson worked with another lesson study group member to prepare a draft of the lesson plan before the first planning session. Then, during the first lesson study meeting, they presented it to the group and shared their rationales for its design. After the meeting, the two teachers revised the plan based on the ideas discussed by the lesson study group. Other lesson study groups choose to write the lesson plan together during their planning sessions, incorporating the group's ideas into it as they proceed (Hurd & Licciardo-Musso, 2005).

Although writing a lesson study report is integral to the process (Fernandez & Yoshida, 2004) and vital for sharing teaching knowledge with other educators (Chokshi & Fernandez, 2005; Hiebert et al., 2002), Fernandez and Yoshida offer the only example of how a lesson study group accomplishes this task. The literature on lesson study in the U.S. indicates that teachers write reports and summaries of their work, and number of report templates and examples are available from groups and individuals who promote lesson study (Ertle, Chokshi, & Fernandez, 2001; Lesson Study Research Group, n.d.; Lewis, 2002). However, no descriptions exist of how U.S. teachers approach the report writing aspect of the lesson study process. As a result, it is impossible to know if U.S.

lesson study groups accomplish the task in the same way as the teachers in Fernandez and Yoshida's study.

Outside experts in the lesson study process. While one strength of lesson study is its capacity to draw upon and utilize practitioners' knowledge of teaching, relying exclusively on teacher knowledge can potentially reinforce, rather than challenge and extend, existing ideas about students and instruction (Hiebert et al., 2002). Thus, lesson study groups often invite "knowledgeable others" (Lewis, Perry, Hurd et al., 2006, p. 275), "outside experts" (Chokshi & Fernandez, 2004, p. 525), or "advisors" (Puchner & Taylor, 2006, p. 923) to participate alongside them as they conduct their lesson study work. In Japan, instructional experts from the local education agency attend key planning meetings to discuss study lessons (Fernandez, 2002) and attend research lesson presentations to observe and participate in the lesson reflection sessions (Fernandez & Yoshida, 2004). In the U.S., professional developers, university professors, district content specialists, or master teachers will consult with lesson study groups to provide information, guidance, or feedback (Chokshi & Fernandez, 2004; Hurd & Licciardo-Musso, 2005; Lewis, 2002). These outside experts play a vital role in the lesson study process because they introduce into the groups new ideas that enrich teachers' knowledge and the research lessons they generate.

Lesson study groups choose outside experts who have content, pedagogical, or curricular knowledge that contribute to the group's lesson study goal (Chokshi & Fernandez, 2005; Fernandez, 2002). These experts participate in the group, sharing their expertise without imposing their ideas or dictating what the group should do. Outside experts also may expedite access to research findings and theoretical ideas that inform the

group's work (Fernandez, 2002). In the U.S., experienced lesson study participants may serve as experts who advise the work of novice lesson study groups (Fernandez et al., 2003). However, it is unclear whether U.S. lesson study groups routinely invite outside experts to participate with them.

Lesson Study in the United States

Research on lesson study in the United States, though limited in scope, highlights both the potential and the complexity of introducing a Japanese professional development practice into the context of American schools. Lesson study evolved in Japan over the span of a century (Lewis, Perry, & Murata, 2006) and is thus tightly interwoven with the norms of Japanese schools and their vision of teacher development. Fitting lesson study to the culture of U.S. schools—or, perhaps, fitting U.S. schools to the culture of lesson study—has proven challenging as well as beneficial.

Challenges of lesson study. Researchers have identified four aspects of conducting lesson study that pose challenges for U.S. schools: the time required for lesson study, the collaborative nature of the lesson study process, the need for common curriculum, and the stance needed to undertake lesson study in a meaningful way. First, lesson study requires significant time. Teachers typically devote 10 to 12 hours to planning a research lesson and several more hours to discussing and revising the lesson once it is taught (Lewis, 2002). In addition, time is needed during the school day for teachers to attend research lesson presentations. In Japan, time for lesson study is built into teacher work hours, and school norms provide opportunities for lesson study work during the school day (Fernandez & Yoshida, 2004). For example, Japanese students work alone in their classrooms while teachers attend research lesson presentations. In the

U.S., however, schools do not necessarily provide time for collaborative work among teachers (U.S. Department of Education, 1996), and few schools are structured to allow teachers to leave their own classes and observe in other classrooms. Finding time for lesson study may require American teachers to work beyond their contractual hours (Chokshi & Fernandez, 2005).

Lesson study also requires a level of collaboration and shared responsibility for student learning not historically present in U.S. schools. American teachers often work in isolation, managing lessons, curriculum, and students with little input from others (Easley, 2000; Slater & Trowbridge, 2000). Lesson study, in contrast, makes teaching both a collaborative and public endeavor. When they participate in lesson study, teachers become mutually accountable for instruction and open their teaching to the scrutiny of their peers. While many teachers value the opportunity to work closely with colleagues during lesson study (Byrum et al., 2002; Hurd & Licciardo-Musso, 2005), joint lesson planning and public teaching may be uncomfortable for some (Fernandez, 2002; Puchner & Taylor, 2006). Successful lesson study will require teachers to reconceptualize their current roles as autonomous decision makers and to overcome concerns about making their professional practice public.

A third challenge of conducting lesson study in U.S. schools is that it requires common curricular ground on which to work. In Japan, the national *Course of Study* facilitates lesson study work because all teachers in a grade level teach the same content, often through the same, or very similar, lessons (Lewis, 2000). American teachers, in contrast, use different textbooks, teach to different state and local standards, and use different teaching methods. Even within the same school, children may not study the

same topics or may not progress through the curriculum in the same sequence. These differences can hinder lesson study work by making it difficult for several teachers to collaborate on a single lesson and teach the lesson in multiple classrooms. Curricular differences also make it difficult for lesson study groups to share their work with teachers in other schools or districts.

Finally, lesson study requires teachers to take an inquiry stance toward lesson planning and implementation (Fernandez, 2002), a perspective that differs from how American teachers are typically asked to approach their work. Teachers in a lesson study group studied by Fernandez (2002; 2003) struggled to pose researchable lesson study questions, design lessons that would answer those questions, specify the type of evidence observers should collect during the research lesson, and interpret and generalize the results of its lesson study work. Fernandez concluded that the teachers' struggles to take a research stance were a "roadblock to powerful lesson study practice" (Fernandez, 2002, p. 401). Thus, U.S. lesson study groups might benefit from outside experts who can help them develop an inquiry approach toward their lesson study work.

Benefits of lesson study. Despite the challenges of conducting lesson study within U.S. schools, teachers themselves cite many benefits of participating in the lesson study process. They report that they learn new instructional practices (Byrum et al., 2002; Rock & Wilson, 2005), become more aware of the practices they currently use (Byrum et al., 2002; Hurd & Licciardo-Musso, 2005), grow in their knowledge of subject matter (Hurd & Licciardo-Musso, 2005), engage in new ways of talking about teaching and learning (Hurd & Licciardo-Musso, 2005; Puchner & Taylor, 2006), learn new ways to think about lesson planning (Byrum et al., 2002), and gain confidence in their ability to

influence student learning (Puchner & Taylor, 2006). Lewis (2002) contends that lesson study also contributes to systemic educational improvement by bringing educational goals and standards to life in the classroom, promoting data-based improvement, targeting many student qualities that influence learning, creating grassroots demand for instructional improvement, and valuing teachers.

Lewis and colleagues (Lewis, Perry, & Hurd, 2009; Lewis, Perry, & Murata, 2006) have developed a framework of lesson study's benefits based on their ongoing work with several lesson study groups. They identified three pathways through which lesson study improves classroom teaching: teacher knowledge, teacher community, and teaching-learning resources. Pathway one is through teachers' knowledge. Lesson study strengthens teachers' knowledge of subject matter, pedagogy, and student thinking, as well as their understanding of connections between long terms goals for student learning and daily instruction. Lewis et al. (2009) described six changes in teacher knowledge that emerged within an elementary lesson study group, including three instances of growth in teachers' knowledge of mathematics, one instance of growth in their knowledge of student thinking, and two instances of growth in their knowledge of pedagogy. Fernandez (2005) also found that lesson study provided elementary teachers opportunities to improve their pedagogical content knowledge of mathematics and their ability to reason mathematically during the enactment of a lesson. However, she noted that teachers did not always "make the most" (p. 284) of these opportunities to strengthen their knowledge.

The second pathway by which lesson study improves instruction is through strengthening teachers' professional community. Lewis et al. (2009) contend that lesson

study strengthens teachers' motivation and capacity to improve their teaching, their sense of mutual accountability to provide high-quality instruction, their shared long-term goals for students, and their shared language and frameworks for improving instruction. These researchers identified five instances in which lesson study promoted professional community among one lesson study group they studied. Their findings converge with teacher self-reports that lesson study promotes productive collaboration that changes the way teachers think and talk about teaching and learning (Hurd & Licciardo-Musso, 2005; Puchner & Taylor, 2006; Rock & Wilson, 2005).

The third pathway to instructional improvement, teaching-learning resources, includes the strengthening of lesson plans and tools that support professional learning (Lewis et al., 2009; Lewis, Perry, & Murata, 2006). Lesson study produces thoughtfully designed, refined lesson plans that have been "tested" and revised for maximum impact on student learning. For example, the teachers in Lewis et al.'s (2009) study modified their lesson to include a more "thought-revealing" (p. 15) mathematical task that enabled students to examine their own and classmates' mathematical thinking. The final lesson plan also promoted learning more effectively than the initial plan, as evidenced by students' improved articulation of the pattern $(n+2)$ represented in the opening problem. In addition, through lesson study, teachers may design resources such as lesson discussion protocols and data collection forms that further their ability to investigate student learning in powerful ways.

Although the claim is empirically untested, a final benefit of lesson study may be that it provides a mechanism for generating, accumulating, and sharing a knowledge base for teaching (Chokshi & Fernandez, 2005; Hiebert et al., 2002). In Japan, lesson study

groups write reports detailing their work and share them with other teachers within and outside their schools (Fernandez, 2002). Some groups publish their reports in the form of books or articles (Lewis, 2000), while others share their findings through publicly taught research lessons that may draw hundreds or thousands of other educators (Lewis & Tsuchida, 1998). Theoretically, lesson study in the U.S. could build a knowledge base for teaching through similar documentation and dissemination of lesson study groups' work. Such a move, however, would require educators to reconceptualize the notion of a knowledge base as centrally held knowledge that is relevant to all cases. Instead, the knowledge base would be held locally, embodied in local structures, and include only the knowledge needed locally (Lewis, Perry, & Murata, 2006). Teachers would draw from this knowledge base by adapting lessons to fit their students and would use local data to judge the effectiveness of a practice in their context.

Theoretical Framework

Although lesson study advocates describe it as a process that produces knowledge about teaching (Chokshi & Fernandez, 2005; Hiebert et al., 2002), how lesson study generates knowledge is not well theorized. Current research has examined lesson study from the standpoints of how teachers engage in it (Fernandez, 2002; Fernandez et al., 2003; Fernandez & Yoshida, 2004; Hurd & Licciardo-Musso, 2005), how teachers benefit from it (Fernandez, 2005; Lewis, 2002; Puchner & Taylor, 2006; Rock & Wilson, 2005), and how it improves instruction (Lewis, et al., 2009; Lewis, Perry, & Murata, 2006) rather than how teaching knowledge emerges through the process. Knowledge generation is implicitly represented within Lewis and colleagues' (2006; 2009) framework because teachers' knowledge may be strengthened (pathway one) and lesson

plan resources developed (pathway three) as lesson study groups produce knowledge about teaching. However, this theory of lesson study does not directly address how knowledge generation occurs.

In order to better understand lesson study as a knowledge generating process, I have drawn from complexity theory, sociology of knowledge, traditional epistemology, and the lesson study literature to theorize lesson study groups as knowledge producing systems. In the following sections, I first describe the character and qualities of knowledge producing systems and how knowledge is constituted within them. I then develop a definition of knowledge that draws together ideas from traditional epistemology and complexity theory. These two sections provide the foundation for how I theorized the lesson study process and the lesson study groups who participated in this study. In the final section of the chapter, I draw upon this theoretical framing to specifically describe how lesson study generates knowledge about teaching.

Knowledge Producing Systems

Postmodern interpretations of the world have called into question the notion of knowledge as objective and untangled from personal and collective values, histories, motivations, and circumstances (Ward, 1996). Human knowledge emerges not through a detached, neutral process of discovery, but from networks of people and the processes, technologies, artifacts, and theories that those people create (Bourdieu, 2004). People ask particular questions, use particular processes and instruments to answer their questions, attend to and disregard particular pieces of information, and interpret information in particular ways. Consequently, the knowledge they produce results as much from their

explicit and implicit decisions about how to undertake the inquiry process as from the empirical evidence that the process generates.

This does not mean, however, that knowledge is merely a human construction with no basis in reality. Instead, knowledge emerges through the interactions between the knower(s) and their real, though interpreted, environment (Davis & Sumara, 1997; Davis & Sumara, 2006). In order to explain how knowledge is constituted within these interactions, it is necessary to distinguish between knowledge and facts (Cilliers, 2005). Facts exist independently from the human knower as a part of their biological, social, cultural, and ecological world. However, facts do not possess any meaning until the knower interacts with and interprets them. Knowledge, then, cannot exist outside of an interpretive framework or without a reality that provides facts for interpretation (Cilliers, 2005). Knowledge, knower, and the world are inextricably intertwined and can be defined only in relationship to one another.

The networks of people who produce knowledge can be understood as complex systems (Davis & Sumara, 2006). Within a complex system, more possibilities exist than are actualized because the system contains many elements that can interact with each other in a vast number of possible ways (Cilliers, 1998). In a knowledge producing system, people interact with each other, with various concepts and ideas, and with different symbols, artifacts, and tools. An almost infinite number of potential interactions exist, and the particular exchanges that do occur shape both the system itself and the knowledge that the system produces. At the same time, the knowledge produced by the system influences the system through feedback loops that allow it to incorporate that knowledge into future interactions (Davis & Sumara, 2006). These complex dynamics

create a situation in which the knowledge generated is contingent on myriad factors and thus is only one of many possible knowledges that could have emerged. A change within any element of the system—a person, an idea, a process, a tool—or within any interaction between the elements would yield different knowledge that would then feed back into the system, further changing the knowledge produced.

Complex systems, in addition to operating according to complex dynamics, are also typically nested within other, equally complex systems (Davis & Sumara, 2006). The networks of people who produce knowledge exist within webs of social relationships and within a cultural and political milieu, as well as within an ecological world. Each of these complex phenomena influence the ideas, processes, and artifacts that exist within the knowledge producing system and influence how the people in the system interact with each other and with those ideas, processes, and artifacts. Because so many influences flow into the system, the number of possible actions and interactions is unmanageably large, and it is necessary reduce the complexity in order to create meaning (Cilliers, 2002). Scientists, for example, decrease complexity by working within particular theories and research methodologies and by fitting their work to the frames of knowledge created in previous experiments (Bourdieu, 2004). These frameworks orient attention toward certain aspects of the phenomena under study and away from other aspects and can therefore be understood as limiting the knowledge that emerges. Yet, as Cilliers argues, knowledge cannot exist without limits. Without an orienting framework people become so overwhelmed by the available possibilities that understanding cannot emerge. Thus, the processes, artifacts, and theories that researchers create simultaneously limit and enable the knowledge that they produce.

While a complex system is influenced by the systems that surround it, the structure of the system itself, rather than its context, determines how it functions (Ceruti, 1994; Davis & Sumara, 2006). In the case of a knowledge producing system, ideas and artifacts from outside the system flow into it, but the people, technologies, ideas, and artifacts already within the system determine how it will react to those influences. Two knowledge producing systems within the same context may function in very different ways and produce very different knowledge because they are structured differently. The system's structure arises out of its history—including what elements have historically constituted the system and the interactions that have occurred between those elements over time—so its past is always partially responsible for its present actions and reactions to outside influences (Cilliers, 1998). However, not only does the system as a whole possess a history, each element that makes up the system also has its own history. For example, the biological-experiential histories of the people involved in a knowledge producing system determine their reactions both to the other elements within the system and to outside influences that flow into the system. At the same time, the reactions of those people contribute to the history of the knowledge producing system itself.

The nested nature of complex systems makes the boundaries between systems ambiguous (Davis & Sumara, 2006). This occurs, in part, because complex systems emerge from and belong to other complex systems, while also being discernable systems themselves. Knowledge emerges from and is a part of a knowledge producing system, but it also exists apart from that system within artifacts such research reports and within the minds of people who read those reports. Similarly, the knowledge generated by a knowledge producing system emerges from the knowledge of the individuals who make

up the system, but that knowledge is distinct from the knowledge of the individuals. Thus, it is difficult to say at what point an idea belonging to an individual becomes an idea that belongs to the group.

In this study, I theorized lesson study as a complex, knowledge producing process. Likewise, I theorized the lesson study groups who participated in the study as complex, knowledge producing systems that operated according to the complex dynamics described above. This framing allowed me to examine how knowledge emerged through the people, processes, artifacts, and ideas that constituted the lesson study groups. In the next section, I build upon this theory of knowledge producing systems by describing the knowledge such systems generate.

Knowledge within Knowledge Producing Systems

One enduring as well as contentious problem within philosophy is the question of what qualifies as knowledge (Cilliers, 2005). Grounded in traditional epistemology, a standard definition of knowledge, as *justified true belief* judges knowledge claims on three conditions: the claim must (1) be true, (2) be believed by the person making the claim, and (3) the claimant must have sufficient justification for believing the claim (Fenstermacher, 1994). Thus, a claim must have epistemic merit if it is to be considered knowledge rather than an idea, insight, understanding, or some other form of awareness.

A *justified true belief* definition of knowledge requires an explanation of what constitutes truth and sufficient justification. While many contemporary epistemologists no longer conceive of knowledge as reflecting absolute, universal, or permanent truths, they argue against “mak[ing] knowledge mean whatever we want it to mean” (Fenstermacher, 1994, p. 38). Instead, they contend that knowledge may have various

degrees of epistemic merit. Chisholm (1989), for example, described a continuum of 13 steps for considering the merit of knowledge claims: (6) certain, (5) obvious, (4) evident, (3) beyond reasonable doubt, (2) epistemically in the clear, (1) probable, (0) counter-balanced, (-1) probably false, (-2) in the clear to disbelieve, (-3) reasonable to disbelieve, (-4) evidently false, (-5) obviously false, and (-6) certainly false. Although philosophers disagree over the degree of justification required for a claim to qualify as knowledge, there is consensus that knowledge requires some type of evidence or reasoning that can be assessed for its epistemological merit.

Claims about the epistemological merit of knowledge about teaching have often been couched in terms of objectivity, subjectivity, and intersubjectivity (Cilliers, 2005; Davis & Sumara, 2006). Objective claims to knowledge seek to remove the influence of the knowledge producing system on the knowledge that it generates. However, as discussed in the previous section, objective knowledge is impossible to attain because knowledge necessarily emerges through the people, processes, artifacts, and interpretive frameworks that give it meaning. As a result, knowledge cannot be detached from the people and circumstances that generate it. Furthermore, because knowledge producing systems unfold from and are enfolded into the larger social, cultural, and ecological systems that surround them, there is no external vantage point from which a system could generate knowledge.

While objective claims to knowledge cannot exist, neither can purely subjective or intersubjective ones (Cilliers, 2005; Davis & Sumara, 2006). Subjective claims about knowledge are untenable because the subjective experiences of participants within a knowledge producing system are shaped by other system elements. While individual

participants may hold subjective interpretations about the knowledge that the system generates, their subjectivity is constrained by the interactions that occur within the system. Similarly, the subjectivity of the knowledge producing system as a whole is constrained by the social, cultural, and ecological systems that surround it. As a result, claims about knowledge are not solely intersubjective, that is, socially constructed and maintained only through social agreement. The knowledge generated within a knowledge producing system cannot mean anything that the participants agree that it means. Rather, that knowledge must maintain coherence and meaningfulness within both the system that produced it and within the larger systems in which it is embedded.

In light of the impossibility of objective, subjective, or intersubjective claims about knowledge, the truthfulness of a knowledge claim is best conceived through Davis and Sumara's (2006) notion of interobjectivity (p. 15, 34). Interobjectivity refers to the recognition that knowledge, knowledge producing systems, and the larger physical world mutually specify one another and that truth is a matter of holding these systems in coherent relationship. Thus, a knowledge claim is deemed true if it is viable, useful, and meaningful within and across the nested systems in which it exists. This conception of knowledge posits that the truthfulness a knowledge claim is contingent on the system that produced it, on the sociocultural and ecological systems that surround it, and on the relationships between those systems. A change within any of the systems or within any of the interactions between them changes what qualifies as knowledge.

This complexity-oriented interpretation of knowledge and truth does not negate a *justified true belief* definition of knowledge, but frames our conceptions of the meanings of truth and sufficient justification. In order for a claim to qualify as knowledge, it must

be viable within several nested systems at once: the individuals who know it, the social and cultural systems of those people, and the ecological world that those systems inhabit. Put in different terms, knowledge must simultaneously “fit” to the structures of each system in which it exists. Fitness does not mean that claims must match across nested systems, but that they must maintain their sensibility, utility, and relevance within each system. For example, a claim about teaching practice cannot qualify as knowledge if it makes sense only within teachers’ personal understandings and not within the social, cultural, material, and ecological systems that comprise their classrooms. Such a claim might be called an idea or a belief, rather than knowledge, because it is not viable or sensible within the other nested systems. Sufficient justification for a knowledge claim, then, depends on demonstrating the claim’s fitness across systems. Thus, a claim qualifies as knowledge if it (1) fits within and across the nested systems in which it exists and (2) the person making the claim can demonstrate that fitness.

This definition of knowledge raises the question of how a claimant might demonstrate the fitness of their claim. Traditional research methodologies, such as quantitative and qualitative research, can provide evidence about a claim’s fitness within and across the systems that a particular investigation encompasses (Davis & Sumara, 2006). So, too, can research conducted by teachers or groups of teachers in their own classrooms (Chokshi & Fernandez, 2005; Cochran-Smith & Lytle, 1990). In addition, many educators also assert that practical reasoning can provide evidence for knowledge claims about teaching (Donmoyer, 1996; Fenstermacher, 1994). Although debates about the appropriateness of different forms of research and reasoning are ongoing, a complexity-oriented view of knowledge production recognizes that all methods of claim

justification are limited and that the justification of a claim is sufficiently warranted only within the systems in which its fitness exists.

Defining knowledge in terms of fit across nested systems also frames our understanding of why knowledge cannot be fixed. Knowledge must evolve with the systems in which it is nested in order to maintain its fit with them (Davis & Sumara, 2006). As a result, claims that qualify as knowledge at one moment in time may not continue to be knowledge once the systems have changed. In addition, knowledge is also contingent because claims deemed sensible within one set of nested systems may not maintain their sensibility within other, similarly nested systems. For example, a teaching practice that is sensible and useful within one classroom may not be viable in another classroom even if both are nested within the same school, district, and community. Differences in the elements that comprise each classroom system—students, teacher, patterns of interaction, and so on—give rise to different knowledge about teaching. Thus, knowledge claims are systems-dependent in that they remain knowledge only within a particular nested set of systems as those systems exist at a particular point in time.

In the following section, I apply the theoretical framework outlined above to the lesson study process and explain how knowledge emerges within lesson study systems as lesson study groups operate. This explanation forms the basis of how I conceptualized the study and lays a foundation for the study's research design, which will be described in chapter three.

Lesson Study as a Knowledge Generating Process

If knowledge must maintain its sensibility and usefulness across the systems in which it is nested, then lesson study provides a particularly useful opportunity for

teachers to produce knowledge. Because lesson study occurs within the systems that comprise the classroom, it allows teachers to demonstrate whether or not a teaching approach fits across those systems. In addition, lesson study prompts educators to share knowledge across different nested classroom systems. Lesson study groups can draw upon the knowledge generated by other groups to determine if that knowledge fits, and therefore qualifies as knowledge, within the systems in which they teach.

Throughout the lesson study process, teachers make knowledge claims about how instruction impacts student learning. These claims can take several forms. During the research lesson planning, teachers may generate novel teaching ideas and theorize about students and learning, or they may share their experiences and observations about teaching-learning interactions that have already occurred in their classrooms. Following the research lesson observation, they describe their interpretations about how students responded to the lesson and make claims about how well various instructional approaches worked. As they write the lesson study report, the group then synthesizes its ideas, observations, and interpretations into generalizations about how the lesson affected student learning. Each of these claims can be accurately conceived as knowledge if they fit across the nested systems in which the lesson study group members operate. For example, a teaching approach suggested by an individual teacher qualifies as knowledge if it fits within the systems that comprise her classroom. Other teachers may contest this knowledge, claiming that it would not qualify as knowledge within their classroom systems, and lesson study provides a mechanism through which the group can demonstrate whether or not the claim fits within different classrooms. Similarly, the claims in the lesson study report qualify as knowledge because they fit the nested systems

of the lesson study group, and other groups can determine if those claims fit the systems in which they operate.

Knowledge emerges within knowledge producing systems through the interactions that occur between system elements (Davis & Sumara, 2006), and lesson study provides three particular opportunities for such interactions: (1) the discussions in the lesson study groups, (2) the classroom teaching experiments that the groups conduct, and (3) the lesson study reports that groups write. In the following sections, I will discuss each of these lesson study components and describe how each prompts interactions that produce knowledge about teaching.

Discussion in the lesson study groups. Knowledge about teaching emerges through lesson study discussion across two different levels: the individual teachers who participate in lesson study and the lesson study group as a whole. This layered emergence of knowledge occurs because the people who make up a lesson study group are themselves complex, knowledge producing systems that are nested within the complex, knowledge producing system of the group (Davis & Sumara, 2006). Thus, knowledge about teaching emerges through both systems simultaneously.

At the individual teacher level, comments made during lesson study discussion generate knowledge as teachers make their thinking visible. Lesson study discussions provide teachers an opportunity to reveal their knowledge of practice, making private, personal knowledge about teaching public and accessible to others (Hiebert et al., 2002). Although some discussions may simply expose ideas already known to individual teachers, rather than produce new ideas, the act of making invisible knowledge visible is generative in the sense that it produces knowledge that was previously unavailable to

others. Through discussion, knowledge emerges from the individual into the collective awareness (Davis & Sumara, 2006). Hiebert et al. contend that this emergence of personal teaching knowledge into the public arena is one way that lesson study transforms practitioner knowledge into professional knowledge for teaching.

At the level of the lesson study group, discussion generates knowledge through interactions among group members and their ideas. Discussion provides an opportunity for critique and elaboration of ideas (Chokshi & Fernandez, 2005; Lewis, Perry, & Murata, 2006), thereby prompting interactions that can produce new ideas about teaching. The Japanese lesson study group studied by Fernandez and Yoshida (2004), for example, critiqued the math manipulatives in its initial research lesson and determined that a better manipulative was needed to support students' mathematical thinking. As the conversation progressed, the group debated the pros and cons of various types of manipulatives and designed a novel manipulative to use in the revised research lesson. This discussion ultimately led the group to generate a list of the qualities of good math manipulatives (Lewis, 2002). Thus, through discussion, lesson study groups may elaborate initial ideas into novel knowledge about teaching.

Classroom teaching experiment. Lesson study also produces knowledge about teaching by structuring interactions to facilitate inquiry around teaching and learning. Lewis, Perry, and Murata (2006) contend that lesson study generally fits the National Research Council's definition of scientific inquiry. The process parallels more traditional research methodologies by giving teachers opportunities to pose research questions and generate hypotheses as they plan the research lesson; test their hypotheses as they teach and observe the research lesson; analyze the findings of their work as they reflect on the

research lesson and the data collected about it; and disseminate their findings as they share their lesson study reports. In essence, through lesson study teachers design and conduct a classroom teaching experiment (Fernandez, 2002).

It could be argued that lesson study takes advantage of the implicit inquiry process embedded in teachers' work. If we assume that teachers intentionally attempt to influence their students' learning, a lesson can be conceptualized as the teacher's best hypothesis about how to create a successful learning experience. Even if they teach directly from their teacher's manual, rather than writing their own lesson plan, teachers work from the hypothesis that something about the lesson will facilitate learning. The act of teaching the lesson implicitly tests the effectiveness of the instructional approaches the lesson utilizes. Reflective teachers then consider whether or not the lesson impacted student learning. Thus, they have implicitly tested their hypotheses about how to help their students learn. If we regard teaching as implicit inquiry, then lesson study makes the inquiry explicit and provides a structured process through which to undertake it.

Lesson study groups pose research questions through setting lesson study goals (Fernandez et al., 2003). In order to pose rich, researchable questions, teachers must transform their general goal into a specific goal that is answerable through the research lesson (Fernandez, 2002). For example, the long-term goal of fostering independent student thinking might, as a lesson specific research question, be stated as, "How can we design instruction that encourages students to problem solve?" Once a group has posed a research question, it generates a hypothesis by predicting how the research lesson will help students meet the lesson study goal (Fernandez et al., 2003). The teachers in one U.S. lesson study group (Hurd & Licciardo-Musso, 2005) set a goal that their students

improve in identifying main idea and details in expository text, and they hypothesized that pairing students to work together and giving them a choice of graphic organizers would accomplish this goal.

Teachers test their hypotheses through the research lesson (Fernandez, 2002). They include in the lesson instructional approaches they believe will facilitate students' movement toward the lesson study goal, thereby embedding their hypotheses within the lesson itself. For example, the U.S. lesson study group mentioned in the previous paragraph (Hurd & Licciardo-Musso, 2005) included partner work and several graphic organizers in its research lesson to test the hypothesis that these techniques would improve students' comprehension of expository text. Lesson study groups then gather evidence about the validity of their hypotheses (the impact of their instruction) by observing students as the research lesson is taught. Following the lessons, they analyze the collected data and make generalizations about the lessons' effectiveness (Fernandez et al., 2003). Thus, like other research methodologies, lesson study structures interactions between people and data in order to generate knowledge that is meaningful.

The classroom teaching experiment generates knowledge about how instruction impacts student learning. As lesson study groups test their hypotheses through the research lesson, they can make claims about how the lessons affected students' understanding and skills. Although the causal claims produced through lesson study may be weak compared to those generated through traditional research methodologies (Lewis, Perry, & Murata, 2006), lesson study generates evidence about how instruction contributes to student learning in a specific context. Teachers in other contexts may then

draw upon and adapt this knowledge to craft instruction that is effective for their students.

Lesson study report. Both the work of writing the lesson study report and the report itself allow for interactions that contribute to knowledge generation. Report writing provides an opportunity for teachers to interact again with the ideas that emerged through the lesson study process. Chokshi and Fernandez (2005) describe the lesson study report as “a document that collects and transforms the raw materials generated through lesson study into a coherent, stand-alone, and sharable reflection” (p. 679). The act of transforming informal notes and lesson plan drafts into a coherent summary prompts the emergence of generalized statements about teaching and learning. At the same time, report writing allows the lesson study group to interact with an imagined audience who will read the report. Clarifying and articulating ideas for an intended audience provides a final opportunity for new knowledge to emerge.

Report writing is also an important aspect of the knowledge generation process because reports capture and represent in a written form the knowledge that lesson study groups generate. Chokshi and Fernandez (2005) contend that lesson study reports, if thoughtfully written, can make the experiences of a single lesson study group relevant to teachers in other contexts. Thus, lesson study reports are also generative in that they provide a vehicle for introducing ideas about teaching and learning into the collective knowledge of the profession. Once this knowledge is introduced into the knowledge base, other educators can further elaborate and extend it, thereby generating additional ideas about teaching and learning.

In order to understand the purpose of lesson study reports within the knowledge generation process, it is important to recognize that the goal of lesson study is not to produce a set of “tried and tested” (Chokshi & Fernandez, 2004, p. 523) lessons that other teachers can replicate in their classrooms. Instead, lesson study produces insights about teaching that others may borrow and adapt for their own purposes and their own contexts. The lesson study report makes explicit the thinking that guides the lesson, and it is this intellectual framework, rather than the lesson per se, that provides knowledge about teaching on which others can draw.

Interactions between the knowledge-producing aspects of lesson study.

Although discussion, conducting a teaching experiment, and report writing each contribute to knowledge production in their own unique way, these aspects of lesson study interact to facilitate knowledge generation. Discussion occurs throughout the process and supports the knowledge production that occurs through the teaching experiment and the lesson study report. The design and implementation of the classroom teaching experiment impacts the discussions that occur within the lesson study groups and the knowledge included in the lesson study report. In addition, the act of writing the report can also transform the knowledge generated through discussion and through the classroom teaching experiment into new ideas.

Because the different aspects of the lesson study process interact, knowledge emerges through them simultaneously. For example, through discussion, lesson study groups generate knowledge that shapes the emerging classroom teaching experiment, and, at the same time, the design of the emerging experiment shapes the discussion of the groups and the knowledge that emerges through that discussion. Thus, the knowledge

generated co-emerges (Davis & Sumara, 2006) through the discussion and the teaching experiment. Similarly, knowledge co-emerges through the interaction of discussion and report writing as the discussion and the report content simultaneously shape one another. Knowledge also co-emerges through the interaction of the teaching experiment and the report as the findings of the experiment are embedded in the report and as the those findings are refined and re-interpreted during the report writing.

Chapter Summary

Generating a knowledge base for teaching is an inherently value-laden, political, and therefore contested undertaking. Attempts to create a knowledge base can be critiqued on many grounds, and lesson study overcomes some of these criticisms. Because it generates teaching knowledge within the nested systems of the classroom, school, and local community (Davis & Sumara, 2006), lesson study produces knowledge that is based in practice and useful to teachers. It creates a knowledge base that accounts for the complexities of teachers' ways of knowing and the challenges of teaching within nested, ever-evolving systems.

At the same time, though, lesson study avoids a knowledge base grounded in teachers' opinions and personally preferred practices. For a claim to qualify as knowledge, it must simultaneously "fit" to the structures of each system in which it exists, and the person making the claim must provide evidence of that fit. Lesson study provides a mechanism for groups to test and gather evidence about the fit of a teaching practice across systems. This gives epistemological merit to lesson study groups' claims about instruction and its effect on student learning. In addition, other lesson study groups can draw upon the knowledge generated by one group to determine if that knowledge fits,

and therefore qualifies as knowledge, within the systems in which they teach. Thus, lesson study allows educators to continuously re-evaluate, reinterpret, and update the knowledge base for teaching.

Chapter Three – Research Design

Case Study

This research is a qualitative multicase study of four lesson study systems and the knowledge those systems produced. Case study method allows researchers to conduct an in depth exploration of an event, activity, process, or individual(s) (Creswell, 2003). In this study, I explored lesson study systems that were comprised of people, processes, ideas, and artifacts. Yin (2009) contends that when investigating abstract phenomena, the researcher must identify a specific, “real-life” (p. 32) case that represents the abstraction. Because the lesson study groups included people who interacted with each other, with ideas, and with artifacts through the lesson study process, the groups represent the lesson study systems under investigation. Thus, each lesson study group served as a case in this case study.

Yin (2009) described case study as empirical inquiry that investigates a phenomenon within its “real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p. 18). Case study method was appropriate for this study because I sought to conduct an in depth exploration of lesson study groups, and the knowledge they generated, as they operated within their most common context, the local school (Lewis, 2002). Furthermore, this research method fit my theoretical stance, which conceptualizes the lesson study groups and the knowledge they generated as complex, and therefore ambiguously bounded (Davis & Sumara, 2006), systems that were influenced by the ideas, artifacts, and tools available within the context in which the lesson study groups existed.

Because a case study encompasses the numerous variables that occur within a phenomenon's context, the researcher cannot collect or analyze all of the data that constitutes the phenomenon (Yin, 2009). Thus, the research design benefits from "the prior development of theoretical propositions to guide data collection and analysis" (Yin, 2009, p. 18). These propositions help the researcher determine which aspects of a phenomenon should be studied, and they provide a logic on which to base analysis. Sutton and Staw (1995) describe such propositions as "a [hypothetical] story about why acts, events, structure, and thoughts occur" (p. 378). Throughout chapters one and two, I have drawn on complexity theory (Davis & Sumara, 2006), a theory of knowledge production within complex systems (Bourdieu, 2004; Cilliers, 2002), research on knowledge for teaching (Fenstermacher, 1994), and Hiebert et al.'s (2002) conception of lesson study to construct the narrative that will guide the research. I summarize this narrative next in order to explicitly tie together the various theoretical strands.

The lesson study systems that were the focus of this research are complex, knowledge producing systems through which knowledge about teaching writing emerged. This knowledge arose from the knowledge of the individual group members as they interacted with one another, the curriculum, and the materials available to them. The past experiences of the lesson study group members, the lesson study process itself, and the artifacts, ideas, and tools within the lesson study context impacted the knowledge that emerged through the lesson study groups. This knowledge was embodied in the documents the groups created as well as within the groups' interactions and within the personal understandings of each individual participant. This conception of lesson study

guided my decisions, described in the following sections, about what data to collect and the strategies used for data analysis.

The Schools and the Participants

Because I was interested in how lesson study might contribute to the development of a knowledge base for teaching writing to K-6 children, participants for this study were recruited from two elementary schools in a medium-sized, urban school district. I selected these particular schools, Hillside Elementary and Deer Valley Elementary, as participants for several reasons. First, I had a prior relationship with both schools and had collaborated on previous projects with the reading specialist at Hillside and the Reading First (RF) coach at Deer Valley. Each of these specialists coordinated professional development in her building, and both had expressed interest in offering a site-based course on writing instruction at their schools. In addition, both were open to implementing lesson study as a component of such a course. Deer Valley's RF coach was particularly interested in lesson study because she had learned about it during RF staff development, though she had yet to participate in a lesson study group.

Another reason that I selected Hillside and Deer Valley as sites for this research is that the cultures of these schools supported the collaborative nature of lesson study. As discussed in chapter two, lesson study requires a level of collaboration not always present in U.S. schools, and I believed that the norms already in place at the schools would facilitate the lesson study process. At Hillside, for example, grade level teams planned lessons together, and co-teaching occurred in many classrooms. Hillside teachers also routinely collaborated on such projects as school-wide improvement plans, curriculum maps, and intervention plans for struggling students. At Deer Valley, the RF initiative

that began two years prior to this study had compelled teachers to work closely with each other and with the RF coach in efforts to improve student reading achievement. As a result, Deer Valley teachers had grown accustomed to collaborating around instructional matters.

A third reason I invited Hillside and Deer Valley to participate in the study is that I felt confident the teachers at these schools could successfully engage in lesson study. When I had worked with them on previous occasions, I found the staff at both schools to be thoughtful, skilled, determined, and caring teachers who worked hard to provide meaningful learning experiences for their students. Given the teacher-driven nature of lesson study, I believed these qualities would enable the teachers to engage productively in the lesson study process.

Finally, I chose these schools as sites for the study because lesson study fit well with a district initiative that encouraged teachers to observe in others' classrooms. Because I anticipated the research lesson observations would pose logistical challenges, such as covering classes with other school personnel so teachers could attend the observations, I reasoned that this district initiative might facilitate the flexible scheduling required to conduct the research lessons.

Classroom teachers and teaching assistants (TAs) within each school were invited by the reading specialist (at Hillside) and the RF coach (at Deer Valley) to participate in a site-based professional development course that engaged them in the lesson study process. I embedded this study within an after-school professional development course to ensure the groups would have enough time to conduct their lesson study work. Teachers' and TA's contracts required that they be compensated for work conducted outside of

regular teaching hours, and the continuing education credits they received for participating in the professional development course was considered a form of compensation because salary increases were based on the number of credits teachers accrued each school year. Each teacher and TA received 15 hours of continuing education credit for this course. I recruited both classroom teachers and TAs to participate in the study because both groups were involved in classroom writing instruction and because both were eligible to participate in site-based professional development courses.

All teachers and TAs in each school were invited to participate, though typical enrollment in site-based professional development courses ranges from 10-12 people. Eleven teachers and TAs from Hillside and eight teachers and TAs from Deer Valley chose to enroll in the course. Thus, 19 people participated in this study. Because the teachers and TAs participated in the lesson study process as peers, I will in the subsequent sections refer to the participants collectively as “teachers” even though the district classified teachers and TAs differently. The teachers in each school formed lesson study groups of four to five people, so the study included four lesson study groups. Each lesson study group and its participants will be described in detail in chapter four.

Gaining Access

As described in the previous section, my prior relationships with both participating schools facilitated the process of gaining access to the study sites. I submitted a professional development proposal to the school district’s director of staff development on behalf of each school, and the course was approved as a site-based professional development. I also submitted a *Request to Conduct Research* to the

district's research director, and the research aspect of this study was approved. In addition, I submitted an application to Syracuse University's Institutional Review Board (IRB) requesting permission to conduct human-subject research. Once I received IRB approval, I asked each participant to sign a consent form that stated her willingness to participate in the research.

Participants were informed that because the lesson study groups would be videotaped, if they wanted to participate in the professional development, they would need to also participate in the research project. All the teachers willingly agreed to this condition, and no one expressed concern about the research aspect of the professional development course. It is possible, though, that the continuing education credits teachers received for the course served as an inducement to participate in this research study.

Procedures

The Professional Development Course

The professional development course consisted of seven, two-hour sessions (14 hours total) that occurred once a week after school during January, February, and March. Although Japanese teachers typically complete a lesson study cycle in three to four weeks, meeting seven or eight hours during that time span (Fernandez & Yoshida, 2004), I allotted more time to the process because the participants had no prior experience with lesson study. I reasoned that novice lesson study groups might move through the process more slowly than experienced groups, and I wanted to ensure that each group had enough time to complete at least one cycle of planning, teaching, and evaluating a research lesson. Lewis (2002) advised that U.S. lesson study groups meet six to fifteen times for 45 to 90 minutes each session, which provides 4 1/2 to 22 1/2 hours of work time. The

wide range of time suggested for lesson study points to the variability of time needed by different lesson study groups. I decided that 14 hours fell comfortably within the range advocated by Lewis and that it would provide a reasonable amount of time for the groups to complete their work. In addition, a 14-hour professional development, plus the one-hour interview described below, amounted to 15 hours of continuing education. This equated to half of the credits the school district required teachers and TAs to accumulate during each school year.

The professional development sessions at each school took place on a different day of the week so I could attend and facilitate the lesson study process at both schools. During the meetings, the teachers engaged in lesson study by planning, evaluating, and revising writing research lessons. The first session included an overview and explanation of the lesson study process and time for the participants to form lesson study groups. In the second session, they began planning their research lessons, and continued planning during each of the following meetings until their lesson was complete. Once each group completed a lesson plan, one group member taught the research lesson to her class, during regular school hours, while the other group members observed and took notes. During the professional development session following the observation, each group discussed and evaluated its research lesson.

The two groups at Hillside Elementary completed the lesson study cycle before the seventh professional development session, so they revised and re-taught their original research lessons. According to the literature (Fernandez & Yoshida, 2004), lesson study groups usually revise and re-teach their lessons one or two times; so the Hillside groups conducted their lesson study in accordance with typical practices. In contrast, each group

at Deer Valley used five sessions planning its research lesson and did not have time to re-teach. They discussed how they would change the lessons, but neither group revised its lesson or taught it again. Thus, the Deer Valley groups implemented an abbreviated form of lesson study. The professional development course will be described in further detail in chapter four, and the way each group conducted lesson study will be elaborated.

In the week following the final professional development session, I interviewed each teacher about her perceptions of the lesson study process and how she believed the experience impacted their understanding of teaching writing. This one-hour interview was scheduled after school at each teacher's convenience.

Researcher Role

During this study, I served as both the researcher and the facilitator of the lesson study professional development. As researcher, I documented the work of the lesson study groups, analyzed the data collected, and developed an interpretive framework to describe and explain the data. As professional development facilitator, I introduced the teachers to the concept of lesson study, guided them through the lesson study process, and provided them with lesson planning and observation forms used by other lesson study groups (Chokshi, Yoshida, & Fernandez, 2001; Lewis, 2002). I also acted as a consultant to the lesson study groups, sharing with them my knowledge of both lesson study and writing instruction.

Reviews of teacher education and professional development research have noted the challenges associated with acting in the dual roles of researcher and teacher educator or professional developer (Clift & Brady, 2005; Grossman, 2005; Risko et al., 2008; Wideen, Mayer-Smith, & Moon, 1998; Wilson & Berne, 1999). Concerns raised by these

reviews include the challenge of maintaining “bifocal” (Wilson & Berne, 1999, p. 198) attention to both the professional development and the research, as well as the need for researchers to adequately address how their actions influence the participants and the professional development under study. In order to address the first challenge, maintaining attention to both the research and the professional development course, I collected data about the after school meetings through videotaping the sessions. This allowed me to focus my energies toward facilitating the professional development while ensuring that the content of the meetings was sufficiently documented for later analysis.

The second concern raised in the literature, the influence of my own actions on the participants and the professional development process, deserves both philosophical and methodological consideration. Philosophically, most qualitative researchers accept the notion that the act of studying people changes their behavior (Bogdan & Biklen, 2003). Researchers who work from a complexity theory framework (Davis & Sumara, 2006), in particular, argue that because they belong to same social, cultural, and ecological networks as the phenomena they study, they necessarily influence the participants in their research. Thus, from a philosophical standpoint, I acknowledge that my presence as a researcher already changed the lesson study process that I investigated.

Although qualitative researchers acknowledge their influence on the studies they conduct, they seek to minimize that influence. Researchers should disrupt the setting they study as little as possible (Creswell, 2003) and refrain from actively manipulating what occurs there (Hatch, 2002). In my role as professional development facilitator, I directly influenced what happened within the professional development course, so I took several steps to minimize the effects of this influence. First, I took care to lead the professional

development in a way that remained true to the phenomenon under study—the lesson study process. I guided the teachers to engage in lesson study as described in the literature (Fernandez & Yoshida, 2004), and acted in a manner consistent with descriptions of an “outside consultant” (Fernandez & Yoshida, 2004, p. 14) who shares her content area expertise with the lesson study groups. The lesson study process itself limits the consultant’s influence because lesson study is teacher directed. Although I facilitated the process, the teachers chose the focus of their lesson study research and generated their own research lessons. When I shared my knowledge of writing instruction with the lesson study groups, the group members chose whether or not to incorporate that information into their lesson. Thus, the structure and norms of the lesson study process limited my influence on the lesson study groups.

Another step I took to address my influence on the professional development and its participants was to delay data analysis until the end of the professional development course. This mitigated, though did not eliminate, the influence of my role as researcher on my interactions with the participants during the professional development sessions. Delaying formal analysis allowed me to act in my role as professional developer without becoming unduly influenced by the emerging findings of the research. However, because informal data analysis occurs in the mind of the researcher even as the data are being collected (Hatch, 2002), I could not completely remove the influence of the research on my actions as professional developer.

The qualitative research tradition calls for researchers to examine critically how their actions influence the people and phenomena they study (Bogdan & Biklen, 2003; Creswell, 2003). One way I accomplished this was, during data analysis, to analyze how

my own actions within the lesson study groups contributed to the knowledge that those groups generated. Drawing on complexity theory (Davis & Sumara, 2006), I conceptualized myself as one element of the knowledge producing systems (the lesson study groups) that were the focus of this study. I therefore analyzed my own actions within the lesson study groups in the same way that I analyzed the actions of the other participants. Thus, my analysis accounts for my complicity in the lesson study systems under investigation.

Data Collection

One strength of case study research is the opportunity to collect multiple sources of evidence (Yin, 2009). These sources allow the researcher to triangulate the data because they serve as multiple measures of the same phenomenon. This study, in particular, required multiple data sources because the boundaries of one of the phenomena under investigation—the knowledge produced through the lesson study systems—are ambiguous. The knowledge generated through lesson study simultaneously existed within the systems themselves, within the documents the systems produced, and, after lesson study, within the understanding of each individual teacher. In order to explore the nature and content of this knowledge, I collected data on each entity in which the knowledge produced through lesson study is located. I interviewed the individual participants, observed the lesson study groups, and collected the documents produced by the groups.

The second phenomenon under investigation in this study, the lesson study systems, was represented by the lesson study groups and the interactions that took place within them. Thus, I utilized the data collected about the groups to analyze how each

system enabled and constrained the knowledge it generated. The methods of collecting data on each data source—participant observation, semi-structured interview, and documents and artifacts—are discussed below in the order in which it occurred.

In order to collect data on the lesson study process, each professional development session was audio and video recorded in its entirety. Both whole group interactions, such as introductory remarks or general discussion, and the work of each lesson study group were recorded. Video cameras were positioned before the beginning of each session to capture the large group introductory discussion and then repositioned to capture the interactions of each lesson study group. Digital voice recorders were used as a back up measure to record the audio of both whole group and lesson study group communications. I collected approximately 45 hours of video and a corresponding 45 hours of audio during the professional development sessions.

Following the completion of the professional development course, I conducted a semi-structured interview with each participant. The interview was organized around three questions: (1) What do you believe you learned through your participation in this professional development? (2) How did the process impact your learning? and (3) What should I change about the professional development course before I use it with other teachers? Following the theoretical framework, which located the knowledge generated through lesson study within the understanding of the teacher participants as well as within the lesson study groups, the first question was designed to solicit each teacher's perceptions of the knowledge her group generated. Because I had theorized that the lesson study process would enable and constrain the knowledge produced by each group, I asked the second question, "How did the process impact your learning?" to elicit

teachers' perceptions of how their group's lesson study impacted the knowledge they produced. The final question about how the lesson study professional development could be improved was designed to ascertain participants' perceptions of what, if any, aspects of the process negatively impacted the experience. I used this data as an additional source of information about how the lesson study systems enabled and constrained the knowledge that emerged from them. Each interview was audio recorded and lasted between ten and forty minutes. Interviews were scheduled at each participant's convenience and conducted in her classroom during her planning period, lunch break, or after school.

During the course of the lesson study process, the lesson study groups produced a variety of documents including comments on the Lesson Planning Tool, lesson plans, observation forms, and written reports of their work. At the end of the study, I collected these artifacts and any other documents the groups produced. However, the Deer Valley groups misplaced all their documentation except for the final lesson study reports, which they completed during the final professional development session. As a result, I recreated the groups' lesson plan outlines and their observation criteria based on the videos of their discussions during the planning process and the debrief sessions. The process through which I recreated these artifacts is described in the next section of this chapter.

The Hillside groups did not have an opportunity to complete their final lesson study reports. Consequently, I collected their Lesson Planning Tools, lesson plans, and observation forms. In addition, Hillside teachers provided me with materials they used during their research lesson and some examples of student work. I included these artifacts in the data set. Thus, the entire data set consisted of transcripts of the professional

development (lesson study) sessions, transcripts of the individual teacher interviews, the final reports written by the Deer Valley groups, and the Lesson Planning Tools, lesson plans, and observation forms created by the Hillside groups.

Data Analysis

The units of analysis in this study were the four lesson study systems. I analyzed two aspects of each system: the interactions among the system's components and the knowledge the system generated. Because these two phenomena are interdependent, I analyzed them simultaneously and worked continuously across each of the data sources. First, I analyzed each lesson study system separately; then I coded for themes across each case. The procedure I followed to analyze the data is described below.

First, I transcribed the videos of the lesson study groups and audio recordings of the participant interviews. Second, because the Deer Valley groups misplaced their lesson plan documents, I recreated their research lessons from the transcripts of the lesson study planning sessions. I accomplished this task by reading the transcripts and identifying the steps of each lesson based on what group members planned would happen during the lesson. As I read each transcript, I recorded each step that the group decided to include in the lesson plan. For example, one group discussed several potential writing topics for the lesson and decided the students would write about a "special person." Next, they discussed several books related to topic, choosing *Just Grandpa and Me* (Mayer, 2001) as the most appropriate book. Throughout this discussion, they referred to reading the book aloud to the class, and one group member concluded this part of the conversation by saying, "So we'd read the book by Mercer Mayer." Based on this discussion, I listed the first step of the lesson as "Read the book *Just Grandpa and Me* aloud to the class." I

continued reading through the transcripts until I had identified each step the group planned to include in their lesson.

Next, I inductively coded the professional development and interview transcripts, as well as the documents created by the lesson study groups, through constant comparative analysis (Glaser & Strauss, 1967). I modified the constant comparative method slightly by delaying analysis until data collection was completed instead of simultaneously collecting and coding the data. As already noted, I chose to do this because it mitigated the influence of my role as researcher on my role as professional developer during data collection.

To conduct the analysis, I identified the knowledge generated by each lesson study group and then created codes that described the nature and content of that knowledge (Research Question 2) and how the lesson study systems enabled and constrained its emergence (Research Question 1). In the following sections, I first describe the problems of identifying the knowledge and how I addressed these challenges during analysis. I then describe how I undertook the coding process and the codes I created.

The Problem of Identifying “Knowledge”

The first challenge of identifying knowledge involved determining criteria for what constituted knowledge in this study. I drew upon the definition of knowledge developed in chapter two, which states that a claim qualifies as knowledge if (1) it fits within and across the nested systems in which it exists and (2) the person making the claim can demonstrate that fitness. However, as I began to code the data, it became apparent that the lesson study participants rarely provided evidence of the fitness of their

claims, so only small portion of the ideas generated by the lesson study groups fit my criteria for “knowledge.”

In light of this finding, I decided to code all of the ideas that emerged through the lesson study systems and then evaluate how closely they fit the knowledge criteria. This decision seemed appropriate for three reasons. First, the purpose of this study was to examine what emerged through lesson study, and I could accomplish that goal by analyzing the ideas, opinions, information, or whatever the groups did generate. Second, by comparing what the groups generated to the knowledge criteria, I could analyze lesson study’s usefulness as a way to generate knowledge for the knowledge base. Finally, because lesson study provides a mechanism for educators to test the knowledge generated by different lesson study groups, the ideas and opinions about writing instruction generated by these lesson study groups could be transformed by others into something that can be considered knowledge.

The second problem of identifying the knowledge generated by the lesson study groups involved determining how to parse the transcripts of the groups’ discussions. As described in chapter two, knowledge emerges through lesson study across two different levels. Individual teachers generate knowledge as they make their thinking visible to the group, but the group also generates knowledge as it discusses the ideas of different individuals. To account for this layered emergence of knowledge, I decided to code both the statements made by individual teachers and the statements that emerged through group discussions.

To identify the knowledge that emerged at the level of the lesson study group, I parsed each transcript into topics of discussion and summarized the discussion’s content.

For example, one lesson study group generated ideas about the nature of elaborated writing. I described this section of the discussion as *what constitutes elaborated writing in kindergarten* and summarized it in the following way:

Elaborated writing is imaginative, detailed, creative, extended, adding more words, detailed, uses descriptive details. It requires students to write down their thoughts, not just general statements like “I was playing outside.” Elaborated writing describes the student’s picture in detail and is precise. To elaborate writing, students match the writing to the picture. C’s summary as she read what she wrote on the *Lesson Planning Tool*: “To be more precise by matching their picture to their writing by adding details that describe the setting, and the characters.”

Once I identified this knowledge, I coded the data as described in the following section.

The Coding Process

After identifying the knowledge generated through the lesson study systems, I read and reread the transcripts and the lesson study documents and developed three sets of codes describing (1) the content of the knowledge that emerged, (2) the nature of the knowledge that emerged, and (3) how that knowledge emerged from the lesson study systems. Each coding system and how I developed it is explained below.

Content of the knowledge. The first coding scheme described content of the knowledge generated through the lesson study systems. To develop it, I conducted an open coding, searching for patterns among the knowledge that had emerged. I then reread the data and collapsed and refined the initial codes into 24 different categories that accounted for all of the knowledge generated (Appendix A). From these 24 categories, I

developed four overarching themes that described the content of the knowledge that emerged from the lesson study groups: knowledge of students, knowledge of instruction, knowledge of the nature of writing, and knowledge of resource use. These four categories are reflected in the findings described in chapter six.

I also identified connections between the four categories. For example, knowledge about instruction often included information about how to structure a lesson so students could engage in it successfully within the time allotted for the lesson. Thus, knowledge about instruction was frequently interconnected with knowledge about students and knowledge about resource use. The connections between the four overarching categories are also described in chapter six.

Nature of the knowledge. The second coding scheme described nature of the knowledge generated through the lesson study systems. I conducted an open coding and then reread the data, combining and refining the initial codes into 16 different categories that fell into eight complementary pairs: (1) ambiguous-clear, (2) implicit-explicit, (3) disparate-integrated, (4) detailed-undetailed, (5) general-specific, (6) evidence-no evidence, (7) hypothetical-grounded in practice, and (8) tentative-certain. I then collapsed these eight pairs into five continua that described how the nature of the knowledge varied. As explained in chapter six, the knowledge varied in its elaboration, integration, explicitness, specificity, and evidence for justification.

How knowledge emerged. The third coding scheme described how knowledge emerged through the lesson study systems. Using the continua of the nature of the knowledge generated, I looked for patterns in how different types of knowledge emerged. For example, I created codes describing how less versus more elaborated knowledge,

disparate versus integrated knowledge, explicit versus implicit knowledge, specific versus general knowledge, and unjustified versus justified knowledge emerged from the lesson study groups. This analysis yielded the following codes: clarity, confusion, too many ideas, overwhelmed, overly narrow, uncertainty/disagreement, summarizing/synthesizing, connections, lack of connections, and ignoring comments. Drawing on Davis and Sumara's (2006) conceptualization of "enabling constraint" (p. 147), I collapsed these initial codes into three categories that described all the instances of knowledge generation that occurred: instances of over constraint, instances of under constraint, and instances of enabling constraint. These three overarching themes form the basis of the findings explained in chapter five.

Triangulation of the Data

Collecting data from three different sources—participant interviews, the lesson study group discussions, and the artifacts the groups produced—allowed for triangulation of that data. I designed the study to include multiple data sources because this created the potential for different, even conflicting, themes to emerge, and I wanted to explore whether the knowledge about writing instruction varied depending on its location—in individual participants' minds, in group discussions, or in the artifacts. Thus, I developed an independent coding system for each data source and then compared the codes across sources. Similar codes emerged across all three sources. This lends credibility to the study findings because each source corroborated the others. For example, as I coded the content and nature of teachers' knowledge, similar themes about (1) students, (2) instruction, (3) the nature of writing, and (4) resource use emerged from what the participants said during the final interviews, what the lesson study groups discussed

during their planning sessions, and what the groups recorded in the lesson study documents they created. The convergence of themes across data sources enhances confidence in the reliability of findings.

Because the codes emerging from the interviews, discussions, and artifacts converged, it was unnecessary to include each data source in the findings chapters that follow. From the standpoint of communicating the data to readers, it was clearer to represent fewer data sources than to ask readers to “jump” between interview, group discussion, and document data as they read. The videos of the lesson study groups and the documents they produced provided the richest data, so findings represented in the following chapters draw largely from these sources. I did not include the individual participant interview data because the main focus of the study, as asserted in the research questions, was on how the lesson study groups generated knowledge. Therefore, I chose to primarily represent the group level data in the data chapters.

Limitations of the Study

The theoretical framework that underpins this study highlights the limitations inherent in researching complex phenomena (Cilliers, 2002). The vast number of interactions that occur within complex systems create an “inevitability of choice” (Cilliers, 2005, p. 612) about which interactions to investigate and which to ignore. The research questions I asked and the theoretical stance I chose made it possible to choose which aspects of the lesson study groups to investigate, but by opening up this particular set of possibilities, I necessarily closed off other ones. Therefore, the knowledge generated through this study is limited. As described in chapter two, however, such limitations enable knowledge production to occur.

The methodology through which I undertook the study, while enabling the study to occur, also limited the knowledge produced. Case studies are limited because they involve a small number of participants and few contexts rather than a statistical sampling that allows generalizable findings (Creswell, 2003). Nineteen teachers and teaching assistants in two elementary schools participated in this study, and therefore the results do not generalize to other teachers in other settings. Rather, the findings of this research highlight potential areas for future study and may be used alongside other research to “follow an accumulation of knowledge” (Kelly & Yin, 2007, p. 133) across multiple investigations.

The study design and data collection methods I chose also had inherent limitations. Because multiple lesson study groups met at the same time, I was not able to observe each group in person and relied on video cameras to capture each group’s work. However, it sometimes proved challenging to precisely reconstruct the interactions within the groups based on recordings rather than first hand participation. In addition, video recording equipment is more intrusive than a researcher who observes participants (Hatch, 2002), so the cameras disrupted the natural setting more than if I had observed the participants myself. Furthermore, participants may have acted differently than they would under typical circumstances because they realized that the cameras were recording their actions and words.

Interviews also have limitations because participants’ responses to questions may be influenced by what they believe the researcher wants to hear (Creswell, 2003). When I asked the participants about their learning in the professional development course, they may have wanted to assure me that they did indeed learn about writing instruction even if

they did not believe that they had. Their desire to please me with their responses may have been magnified because I was not only the researcher, but also the professional development facilitator.

The data analysis was also limited by the fact that I did not collect all of the lesson study artifacts produced in each group. As will be described in detail in chapter four, two of the groups did not have time to complete their final lesson study report, and three of the groups could not locate their written research lesson plans at the end of the study. As a result, the document-based data set was incomplete. While I drew upon the transcripts of the lesson study groups to reconstruct the content of the research lessons based on the groups' discussions, this reconstruction is less accurate than what the groups themselves wrote. Furthermore, this missing data was significant because the lesson study artifacts are key sites in which the knowledge produced through lesson study is documented for the knowledge base (Fernandez & Yoshida, 2004).

Finally, the research is also limited by the influence of my own actions on the lesson study process and the knowledge generated through it. While observer effects occur during most research (Bogdan & Biklen, 2003), the impact of researcher influence is potentially more significant in this study because I facilitated the professional development sessions and acted as a consultant to the lesson study groups. Although I took steps to minimize this influence and, through analysis, accounted for how my actions might have impacted the lesson study groups, my direct involvement in the phenomenon under study is a limitation of this research.

Chapter Summary

This chapter provided a description of the study's research design and the qualitative methods I used to conduct it. I explained how the methodology fits the study's theoretical framework, the rationale for choosing the study sites and participants, and the way in which the data were collected. I then described the procedures I used to analyze the data and coding schemes that emerged. Finally, at the end of the chapter, I explained the study's limitations. Thus, this chapter, along with chapters one and two, provide the basis for understanding the study's findings, which I present in the chapters that follow.

Chapter Four – The Lesson Study Systems

The theoretical framework that underpins this study conceptualizes the lesson study groups as complex, knowledge producing systems. Like all complex systems, these groups consisted of many interacting elements and existed within a web of other complex systems. In this chapter, I will describe the systems in which the lesson study groups were nested—their schools and district—and the elements that comprised the groups—the group members, the lesson study process itself, and the artifacts and ideas available to the groups. As a result, this chapter reads as a description of the lesson study process, a description of the study participants and their school contexts, and a description of some of the study findings. While this is an atypical structure for a reporting research, the organization of this chapter allows me to present the lesson study groups in accordance with the theoretical framework—as nested in and interacting with their contexts and the lesson study process in which they participated.

Because knowledge is shaped by the systems through which it is produced, one must understand a knowledge producing system in order to understand the knowledge it generates. Thus, the purpose of this chapter is to explain the lesson study systems so that the reader will better understand the knowledge that emerged through them. However, as noted in chapters two and three, descriptions of complex systems must always be partial, and the following account is no exception. I have chosen to describe the aspects of the lesson systems that proved most relevant to the knowledge that the lesson study groups produced.

The chapter is organized in two sections. The first describes the district and the schools in which the lesson study systems operated, and the second describes the lesson study systems themselves. Because these complex systems were nested and ambiguously bounded, the distinctions I have drawn between them are a means of framing the phenomena under study rather than a representation of “real” system boundaries (Davis & Sumara, 2006). For example, I chose to include teachers’ perceptions of the district writing curriculum in the discussion about the district and schools in order to highlight the relationship between the official curriculum and teachers’ ideas about it; however, teachers’ perceptions also existed within and influenced the lesson study groups. Similarly, the district writing curriculum acted as both a component of the district and schools and as an artifact within the lesson study systems. Thus, I chose to discuss the curriculum as an element of both systems in order to highlight how it functioned within each system.

Participating District and Schools

Two schools, Hillside Elementary (HS) and Deer Valley Elementary (DV), participated in the lesson study professional development course. Both schools were located in the same mid-sized, urban school district in upstate New York, and both served students of diverse racial and socioeconomic backgrounds. Hillside Elementary, for example, reported that 68% of its students were White, 28% Black, and 1% Hispanic. Fifty-three percent of Hillside students were classified as economically disadvantaged, and 49% were eligible for free lunch. Deer Valley reported that 72% of students identified as Black, 18% as White, and 6% as Hispanic. Eighty-four percent of Deer

Valley students were classified as economically disadvantaged, and 70% were eligible for free lunch. Neither school reported any of its students as English language learners.

The district writing curriculum was a part of the larger English Language Arts (ELA) curriculum and consisted of a list of student performance indicators and suggested instructional strategies for each marking period. The kindergarten writing curriculum, for example, indicated that during the first marking period students should learn to write legibly some upper and lower case letters; write from left to right with proper spacing; use color words as directed for pictures and match color and word; copy letters and words from books, magazines, signs, charts, and their own dictation; write their name on pictures, drawings, paintings, and written products; write voluntarily to communicate for different purposes; and share their writing with others. Instructional strategies for teaching students to meet these performance indicators included setting objectives and providing clear and specific feedback; reinforcing effort and providing recognition; assigning homework and practice; modeling writing for students; modeling letter formation and reinforcing it with explicit feedback; using “shared writing”; scaffolding writing and giving direct feedback on letter formation; and giving direct feedback to independent writing.

While the writing curriculum offered a general outline of what and how to teach, it was not organized into units of instruction, so teachers had to transform the performance indicators and suggested instructional strategies into specific lesson plans. As Martha, the reading teacher at Hillside, described it, “There is writing in [the curriculum], but it doesn’t tell you how to do it.” The most detailed writing lesson plans that the district provided were embedded in the teacher’s manual of the reading series.

These lessons suggested prewriting, drafting, revising, and editing activities for writing assignments related to the selections students read from their reading textbook.

In an effort to create more detailed plans for teaching writing, a group of Hillside teachers had developed writing units for each grade level that aligned with both the ELA curriculum and the reading series. Each unit plan listed a genre to be taught, a writing prompt, and suggested teaching activities. For example, a second grade unit indicated that students would write descriptive paragraphs in response to the prompt *Write a descriptive paragraph of one of the spiders in the selection "Spiders Up Close"* (a selection in the reading series textbook). The suggested teaching activities included brainstorming words to describe a spider's body parts and completing the prewriting, drafting, and editing activities suggested in the reading series teacher's guide. According to Martha, about half the teachers in the school utilized these teacher-created plans. The other half either designed their own writing instruction or integrated writing into other subject areas.

Although the district writing curriculum was available to teachers at Deer Valley, the general consensus among the professional development participants was that "there is no writing curriculum." This perception may have come from the fact that, unlike other subject area curricula, the writing curriculum did not have supporting materials such as textbooks and teacher's manuals. As one Deer Valley teacher explained, "I have a manual for reading. I have a manual for math. Even for social studies and science, we have materials for it. Writing, just do it. Teach writing. There's no way of knowing..."

Without a detailed writing curriculum or supporting materials, Deer Valley teachers taught writing in different ways. Carol, a kindergarten teacher who participated in the professional development, explained that, "With writing there is no manual. Our

writing programs are different because there is nothing there to guide us.” Mandy, a special education teacher, also attributed the school’s inconsistent writing instruction to the lack of an instructional “model”:

You have [the reading series], and everyone follows it, and it goes sequential. Then you get to writing and everyone does their own thing, something different. You do what you think you should do, and then next grade does what they think they should do. It’s not like, “Okay, everyone’s going to use this model.”

Despite the general consensus that no writing curriculum existed, the teachers who participated in this lesson study seemed to operate from a shared understanding of what students should learn during writing instruction. For example, the kindergarten teachers all expected that, by the end of kindergarten, students would be able to draw an original picture and write at least one sentence about it. The second grade teachers expected that their students would write compositions, comprised of at least two paragraphs, about a single topic and include details, complete sentences, and accurate capitalization and punctuation.

The Deer Valley participants also felt that the school’s Reading First (RF) status, which provided federal funds to support reading instruction, drew attention away from teaching writing. Several of the teachers asserted that “writing’s not a focus in the school,” and they argued that the lack of emphasis on teaching writing contributed to the inconsistent writing instruction that occurred within the school.

Although the district did not promote a particular model of writing instruction, two ideas about teaching writing seemed to exist at both Hillside and Deer Valley: reading books aloud during writing lessons, and having students draw pictures as a part of writing. Three of the lesson study groups, one at Hillside and both at Deer Valley, included “read aloud” books and picture drawing in their research lessons. While it is not

clear from the data where these ideas about writing instruction originated, it is notable that each group independently proposed the same instructional techniques even though they were in different schools and planning lessons for students at different grade levels. This finding suggests that reading aloud and picture drawing were pervasive ideas within these schools.

The Lesson Study Systems

The lesson study systems investigated in this study included the lesson study process, the ideas and artifacts within each lesson study group, and the participants who comprised each group. The following sections describe each of these system elements. First, I provide an overview of the lesson study process. Although the teachers generally engaged in lesson study as described in chapter two of this dissertation, I altered several aspects of it to fit the Hillside and Deer Valley contexts. Thus, the first section below discusses these changes and the rationales for them. The second section then describes the ideas and artifacts that existed within the lesson study systems. The final two sections describe, in turn, each lesson study group, the teachers who participated in it, and how the process unfolded within each group.

The Lesson Study Process

One challenge of planning the lesson study professional development was determining how, or even whether, to modify the process for the U.S. context and for teachers who had no previous experience with lesson study. As noted in chapter two, few published reports of U.S. lesson study groups exist, and only a few of these (Fernandez, 2002, 2005; Fernandez et al., 2003; Lewis, 2002; Puchner & Taylor, 2006) document the experiences of novice groups. Thus, it is not clear from the literature how, or if, lesson

study must be transformed to fit the culture of U.S. schools, nor is there evidence about how to best support teachers new to the lesson study process. Although lesson study groups tend to become more sophisticated in how they undertake their work over time (Lewis, et al., 2006), the available literature indicates that even novice groups can successfully create lessons that support students' learning (Lewis, 2002; Puchner & Taylor, 2006). I therefore was confident the process itself would facilitate a successful outcome. However, after considering the professional development context, I decided to modify three aspects of the lesson study process: goal setting, research lesson observations, and writing lesson study reports.

Goal setting. Although lesson study prompts teachers to develop four levels of goals to guide the research lesson—long-term student development goals, content area goals, unit goals, and goals specific to the research lesson itself—I asked the teachers in this study to develop only a content area goal for writing and a lesson goal for the research lesson. I made this decision for several reasons. First, because the teachers were new to lesson study, I worried that asking them to develop so many goals might seem overwhelming and perhaps frustrating. This concern was heightened by the fact that the lesson study literature provides no examples of how teachers successfully navigate between goals at different levels. I suspected that developing and aligning goals across levels, as well as planning a research lesson that simultaneously addressed different levels of goals, might prove too large an undertaking for novice lesson study groups in a seven-session professional development course.

In addition, the teachers did not have access to resources that would facilitate a manageable goal setting process. In Japan, the national *Course of Study* provides long-

term, subject-specific, unit, and lesson goals for every grade (Lewis, 2002). The district writing curriculum, however, did not provide clearly defined goals or objectives. As a result, the teachers would need to determine how the curriculum's performance indicators translated into subject area, unit, and lesson goals and then decide how those goals related to a broader long-term goal. While this might have been a worthwhile undertaking, the task seemed too cumbersome to embed in a lesson study process that was already new to the teachers. I was also concerned that extensive goal setting would encroach on time needed for planning and debriefing the research lessons.

Additionally, I was aware that developing long-term, broadly conceived goals about student characteristics such as curiosity and citizenship (Fernandez & Yoshida, 2004; Lewis, 2002) deviated from the norms of the district's typical professional development. Site-based professional development generally addressed specific content area methods and instruction. The teachers had agreed to participate in a professional development on writing instruction and were expecting to discuss that topic during the sessions, and I worried that it might frustrate them to devote substantial time to setting goals that appeared, at least on the surface, unrelated to teaching writing.

Given these concerns, I decided to ask the teachers to develop a broad goal for writing instruction and a related goal for their research lesson. I reasoned that setting two, rather than four or more, goals would shorten and clarify the task yet maintain the integrity of the lesson study process.

Research lesson observations. A second aspect of lesson study that I modified was the observations of the research lessons. Ideally, all of the teachers in a lesson study group observe the research lesson so everyone will have firsthand knowledge of what

occurred (Fernandez & Yoshida, 2004). This facilitates the lesson debrief because each group member can share his or her perceptions of how the lesson unfolded. However, unlike Japanese teachers, teachers at Hillside and Deer Valley could not leave their students unattended in the classroom while they observed the research lessons. The only way to ensure that every teacher in the professional development could attend her group's lesson was to have substitute teachers available to take over her classes, but this was impossible to accomplish because no funds existed to pay substitutes.

As I planned the professional development course with the Hillside's reading teacher and Deer Valley's RF coach, we discussed how to enable teachers to observe the research lessons. At both schools, teachers commonly asked TAs to "cover" their classes for short periods of time while they attended meetings within the building, and we decided that we could use a similar arrangement for the research lesson observations. However, both the reading teacher at Hillside and the RF coach at Deer Valley cautioned that it might be impossible to find enough TAs to supervise the classes of all the lesson study group members. In light of this situation, I decided to define a "research lesson observation" as one group member teaching the lesson while at least one other member observed. While this was not ideal, I accepted it as a limitation of conducting lesson study in these settings and hoped that, in most cases, we could schedule the research lessons to allow several teachers to observe.

Lesson study reports. As described in chapter two, lesson study reports are extensive, in depth documents that detail teachers' thinking about their research lessons. Although vital to the lesson study process, lesson study reports differ dramatically from the lesson plans that Hillside and Deer Valley teachers typically wrote. The district did

not require its staff to submit formal lesson plans, so most teachers jotted only brief notes to themselves about the lessons they would teach. In addition, professional development courses in the district did not usually require teachers to create products such as detailed plans and in depth reports of their work. Thus, I was concerned that the teachers might find it burdensome to produce a lengthy and detailed lesson study report.

In the one published example of teachers creating a lesson study report (Fernandez & Yoshida, 2004), individual group members shared responsibility for writing the report. Two teachers wrote the introductory section and the initial lesson plan draft before the lesson study group met, and after the meeting these same teachers wrote a second draft of the plan based on the group's suggestions. Once the research lesson had been taught, a different teacher in the group wrote a third draft of the plan based on ideas generated during the lesson reflection. This division of labor allowed the group to share the work of creating the lesson study report, but it also required individuals to do a significant amount of work outside of the lesson study sessions. The professional development norms at Hillside and Deer Valley, as well as the teachers' contracts, dictated that all professional development work occur within the 15 hours for which teachers received credit. Because the lesson study groups met for 15 hours to plan and debrief their research lessons, I felt it would have been inappropriate to request that they conduct any work outside of the lesson study meetings.

The *Lesson Study Report Guidelines* (Chokshi et al., 2001) from Teacher College's Lesson Study Research Group suggests that teachers write the lesson study report after completing the lesson study process by "retracing and documenting the steps" (p. 1) that occurred. Writing the report at the end of the process allows teachers to

consolidate their own learning as well as to produce a document that communicates their ideas to others. However, I was concerned that writing the full report at the end of the process might seem overwhelming and perhaps even tedious or redundant.

As a result of these concerns, I decided to have the teachers complete the lesson study report as a group throughout the lesson study process. I gave each group a copy of *A Tool for Planning and Describing Research Lessons* (Appendix B), a planning template that I adapted from Ertle, Chokshi, and Fernandez (2001) and Lewis (2002). This template, which I called the Lesson Planning Tool (LPT), served two purposes. First, it provided prompts that guided the teachers through the lesson study process. Second, it provided a place for teachers to take notes and record their thinking as they planned their lesson. During the final professional development session, I asked each group to document their lesson study work by elaborating their notes into a final, typed report that followed the same format as the planning template. These final reports are in Appendices C and D.

The initial professional development session. Because the teachers were unfamiliar with lesson study, I devoted the first professional development session at each school to introducing the lesson study process. Using a set of handouts I created about the lesson study process (Appendix E), I explained each phase of lesson study—choosing a research theme, planning a research lesson, teaching the lesson and collecting evidence of student learning, reflecting on the lesson, and writing a lesson study report—and explained what would take place during each phase. I also compared traditional professional development with lesson study so teachers would better understand how the professional development course would differ from previous courses they had attended.

After I explained the lesson study process, the teachers discussed potential writing goals that might serve as the focus of the research lessons. I facilitated this discussion by guiding the teachers through the first step in lesson study: comparing the qualities they wanted their students to exhibit to the qualities students currently demonstrated. I asked, “What gap do you see between the student writers you hope to develop and the writers that currently exist in your school?” This question led to lengthy discussions about the types of writing teachers wanted students to produce, the actions they wanted student writers to engage in, and the struggles they felt their students currently encountered while writing. The teachers at Hillside decided to focus on helping students elaborate their writing, while teachers at Deer Valley decided to plan their research lessons to help students know how to begin writing when an assignment was given.

Ideas and Artifacts Within the Lesson Study Systems

Many different ideas and artifacts existed within the lesson study systems. Each teacher participant brought to her lesson study group prior knowledge about students, teaching, writing, and writing instruction. Each group also held shared ideas about students and writing instruction that were embodied in school norms and in artifacts such as the writing curriculum and the writing lessons in the reading series. At the same time, as each lesson study group generated new ideas about teaching writing, these ideas also became elements of the lesson study systems. Because so many ideas existed within these systems, it was impossible to identify and document them all. However, three artifacts, and the ideas embedded within them, seemed to influence the knowledge generated by the lesson study groups: the Lesson Planning Tool (LPT) I distributed to the groups

(Appendix A), the writing curriculum, and the professional books provided for the professional development (listed in Appendix F).

The artifact that seemed to most profoundly shape the knowledge produced by each lesson study group was the LPT. This document guided the teachers as they planned their research lessons, and it therefore enabled, yet also constrained, how the groups engaged in the lesson study process. The LPT directed the topics of conversation discussed by groups, as well as when each topic was discussed. For example, each lesson study group began by discussing its lesson goal and the context in which the research lesson would occur because these were the first two topics listed on the document. Although some groups did not complete every section of the LPT and others discussed the questions in a different order than listed, the interplay between the groups and this document directly impacted the knowledge produced through this lesson study endeavor.

The LPT also impacted the knowledge generated by the lesson study groups by prompting the teachers to create a permanent record of their discussions. Although I did not specifically direct the groups to do so, each group began each lesson study session by reading aloud from their LPT to review the ideas they discussed and the decisions they made the previous week. Thus, the notes on the LPT provided the starting point for each week's discussion. Notably, this written record existed because I made the decision, described above, that the groups should complete the lesson study report throughout the lesson study process rather than at the end. While it is impossible to know how the groups' work would have differed without the notes on the LPT, it is evident that having written notes impacted how the groups undertook the lesson study process.

The district writing curriculum acted as a more influential artifact in the Hillside lesson study groups than in those at Deer Valley. As noted in a previous section, the Deer Valley teachers worked from a shared conception of what students should learn during writing instruction rather than from the official curriculum documents. The Hillside teachers, however, utilized the curriculum while planning their research lessons. Because the performance indicators for writing were embedded within the district's ELA curriculum document and were difficult to locate, Hillside's reading teacher created a chart for each lesson study group that summarized the writing portion of the curriculum on one 11x14 page. She distributed these charts to the groups during the first professional development session, making them particularly accessible during the planning process.

A third set of artifacts available to the lesson study groups were professional books about writing instruction (Appendix F). These books, from both my personal library and the libraries of the reading teachers, were available to the teachers throughout the lesson study process. For the most part, these books approached writing instruction from a process writing (Calkins, 1994) perspective. Although each group examined the books briefly after the first professional development session, the Deer Valley teachers and the Hillside kindergarten group only looked at the covers and thumbed through them. They did not read any book nor did they discuss the books' contents with one another. In contrast, one teacher in the 2nd grade group at Hillside examined several books throughout the first professional development session. She asked to borrow one and took it with her, and she returned to the second professional development session describing how she used a graphic organizer she found in the book with her class. As described in

greater detail in the following section, her group used a similar graphic organizer in their research lesson.

Lesson Study Groups at Hillside Elementary School

Eleven participants completed the lesson study professional development at Hillside Elementary. During the initial professional development session, the teachers set a lesson study goal of helping students to elaborate their writing. They chose this goal because, across grade levels, all teachers had noted a lack of detail in their students' writing. The group also decided to work in two lesson study teams: one that would plan a lesson for kindergarten students and one that would plan a lesson for second graders. Each participant then chose which group she wanted to join. The work of these groups is described in detail in the following two sections and summarized in Figures 3 and 4 at the end of the chapter.

Kindergarten lesson study group. Four kindergarten teachers, one kindergarten TA, and the school's reading teacher formed the kindergarten lesson study group at Hillside (HS K group). The four classroom teachers included Courtney, who had taught kindergarten at HS for 20 years; Tonya, who had taught kindergarten at HS for 11 years; Sharon, who had taught kindergarten at HS for 4 years; and Mary, a special educator who had taught a self-contained, combined kindergarten and first grade class for students with disabilities at HS for two years. Kristina, a TA who worked in both Courtney's and Tonya's classrooms, had worked as an assistant in kindergarten at HS for five years. Martha, the reading specialist, began the professional development as a member of the second grade lesson study group but joined the HS K group after the first two sessions

because she wanted an opportunity to work more closely with the kindergarten teachers in the school.

During the second professional development session, the group discussed the questions on the LPT, and Courtney recorded their ideas on the form. Through this conversation, they generated a description of what constituted elaborated writing in kindergarten and discussed why their students struggled to write elaborated sentences. By the end of the session, the group had decided they wanted each student to draw a detailed picture and write a detailed sentence that described the picture. They concluded that, in order to help the children reach this goal, they would need to “continually ask [students] to elaborate on the details of their picture” and to use “interactive writing with the whole group to model” how to write about the details students drew in their pictures.

During session three, the group finished discussing the questions on the LPT and began planning the specifics of the research lesson. Courtney described a workshop she had attended in which the presenter highlighted the importance of having young students draw and label pictures as a part of the writing process. She suggested the lesson be designed so students would draw, label, and then use the words from the labels to write a sentence describing the picture. The others agreed that this was a good idea, and they discussed how to sequence such a lesson. This discussion sparked the question of whether the teacher should draw a picture and show students how to label it and write a sentence or whether the teacher should lead the students to draw, label, and write. After extensive discussion, the group decided the class would collaboratively draw a picture in response to a story, the teacher would help students label the picture, students would talk in pairs

to develop a sentence about the picture, and the teacher would use the sentences suggested by the students to model how to write a sentence.

During this session, the group also engaged in a lengthy discussion of what book to use as a read aloud at the lesson's beginning. They wanted to use a book related the current season—winter—that had concepts that could be easily labeled but that had enough ideas that students could generate a detailed picture. The group discussed four different options, and they settled on *The Snowy Day* (Keats, 1962), a book familiar to all of them.

The group also began to discuss what the lesson observers should look for at different points in the research lesson. They wanted data about whether students were “active listeners” during the read aloud, whether their responses during the group discussion of the book were accurate, whether they accurately drew and labeled the class picture, and whether they wrote a sentence about the picture. Before the group finished this discussion, the professional development session ended, and the teachers decided to complete the observation criteria during the next meeting.

The group devoted the fourth professional development session to clarifying the details of the lesson and the observation criteria. Martha had typed up the plan they developed in previous session, and the teachers read over it, raising questions. Courtney raised a concern about “nonverbal” students participating in a think-pair-share:

Courtney: When you have children that are nonverbal or have severe articulation, it's difficult. We make groups of 3 sometimes, you know, there's things we can—Because year after year after year, it's always an issue with me.

Martha: I'll write that down. Modification...

Courtney: And how to modify it to include all kids. If I do partners for math games or something, that child can roll the dice, that child can do a lot of different

things. But when it's a verbal exchange. When it's supposed to be just a quick verbal exchange.

Courtney's concern prompted a discussion in which the teachers generated ways to include nonverbal students in the think-pair-share. The group also discussed other aspects of the lesson, including how to create consensus among students about what to draw in the collaborative picture, how to include as many students as possible in drawing and labeling, how to help students create a picture that included the details from the story, and how the teacher would decide which of the student suggested sentences to write on the picture. Martha typed these details into the lesson plan and printed a copy for each teacher (Appendix G). At the end of the session, the group clarified the points to notice and evaluate during research lesson observation, and Martha created an observation form on which the teachers could take notes during the lesson (Appendix H).

Between sessions four and five, the research lesson was taught two times. Sharon taught the lesson to her class while Martha observed, and Mary taught the lesson to her class while Kristina observed. Below is the lesson plan as Martha typed it for the research lesson:

Teacher will read aloud the story, *The Snowy Day*.

Teacher will lead a group discussion about the book including the following story elements: main character(s), the story setting and details/events.

Teacher will then tell children they are going to use the large paper to draw a picture together about the story and put labels on their picture.

Teacher will support their writing by stretching out the word. Teacher will accept what they write and NOT correct the writing.

Continue drawing and labeling and adding details until you have the main points of the story on paper.

Teacher will respond by saying: Look at the picture we made together. In a minute tell your partner about the picture. (Knee to Knee partner or assigned partners).

After “think time each partner will tell the other about the picture. You may need to explain how this is done if you have not used this procedure called *Think, Pair, Share* in your classroom.

Ask one of the pairs of students to give you their sentence about the picture. Model writing the sentence below the picture. Think out loud about how you can elaborate the writing by noticing another detail in the picture to write about. Teacher writes a second sentence.

Figure 1: HS K research lesson plan

Using the debriefing protocol (Appendix I), the group discussed the lesson, and it became apparent the two teachers had taught it in different ways. Sharon asked students to write the sentence rather than writing it herself, and Mary had her students “act out” the character’s actions (walk like a duck) during the read aloud. In addition, the two teachers conducted the think-pair-share at different points in the lesson. Sharon’s students discussed the story after it was read, while Mary’s students discussed possible sentences that could be written about the picture once the picture had been drawn.

Despite the differences in how Sharon and Mary executed the lesson, the HS K group agreed that students in both classrooms had met the lesson objectives. Specifically, they thought the lesson had improved students' abilities to "relate their picture to the story" and "relate their sentence to the story." The group also agreed the lesson should be shortened because it had lasted over 40 minutes in each classroom, which they felt was too long for kindergarteners. They discussed how to "break it into parts" so it could be taught over more than one day.

Between the fifth and sixth professional development sessions, Courtney taught the research lesson to her class while Sharon and Kristina observed, Tonya taught the lesson to her class while Mary observed, and Kristina taught the lesson to five children in the after school program while Martha observed. Although the group had discussed, during the first lesson debrief, how to change the lesson, these teachers taught the lesson as it had originally been designed. During session six, the teachers again discussed the length of lesson, concluding that, "Kindergarten doesn't want 45 minutes lessons." They decided that they had "tried to do too much" during the lesson and that they should have focused only on drawing and labeling. The group then discussed a follow up lesson that would focus on writing a sentence.

The final professional development session at Hillside was cancelled because a faculty member (who did not participate in the professional development) died unexpectedly. Understandably, the members of the HS K group were grieved by this loss and wanted to attend the funeral, which was scheduled at the same time as our final session. Thus, the teachers did not have an opportunity to consolidate the notes they took during the lesson study process into a final lesson study report.

Second grade lesson study group. The second grade lesson study group at Hillside (HS 2 group) included three second grade teachers, a “resource” teacher who taught third and fourth grade special education students, and a TA who worked one-on-one with a special education student in first grade. Linda and Tracy, two of the second grade teachers, had co-taught a class for both general and special education students at HS for ten years. Although Linda was certified as a general education teacher and Tracy as a special educator, both teachers taught all of the students in their class at various time during the day. They “looped” with their children, teaching first grade during one school year and second grade during the following year. Tiffany, also a second grade teacher who looped with her classes, had taught first or second grade at HS for five years. Celia, a special educator, had worked at HS for seven years as resource teacher who taught various groups of third and fourth grade special education students throughout the day. Maureen, a one-on-one TA who was assigned to a particular special education student each year, had worked in her position at HS for five years. During the time of the professional development course, she served as a “one-on-one aide” to a first grader with both cognitive and physical disabilities.

Three other teachers began the professional development as members of the HS 2 group but did not continue with the group until the end of the course. Dana, a second grade teacher, attended sessions one, two, and five but her son’s illnesses forced her to miss the other sessions. Cynthia, a first grade teacher, attended the first two sessions, but her other professional and personal commitments made consistently attending the professional development sessions impossible. After the first two sessions, Martha, the reading specialist, decided to work with the HS K group because she had helped the

second grade teachers on previous projects and wanted an opportunity to work with the kindergarten teachers.

During the second professional development session, the group began its discussion with Martha reading aloud from the LPT. She read, in quick succession, each of the six questions bulleted in Section IA (Appendix B). The teachers were unsure how to respond, and they sat silently for a few moments before Martha prompted them, saying, “Our objective?” to reiterate the questions she had read. The group discussed potential lesson objectives for a few minutes, but the teachers did not come to any conclusions. After about ten minutes, Martha called me to the group and asked, “Vicki, what’s the best place to start with these questions?” According to the transcript of this planning session, I told them:

Let’s focus in on the specific student learning piece. If we’re going to think about elaboration, the goal we chose earlier—In the category of elaboration, what kind of writers do we want to have? What we want them to be able to do with elaboration? And then the second thing, what are they doing now? And then, how do we bridge that gap? And that’s going to help us figure out what we’re going to teach.

These directions seemed to clarify the task, and the teachers began discussing how they wanted the children to elaborate their writing. They decided elaborated writing should include pertinent details, varied vocabulary and sentences, and transition words, and it should be connected, sequential, and flowing.

The group also discussed how students struggled to generate details and write about them at the same. Because many children were still “emergent” writers, they wrote

slowly and often forgot what they intended to write. Linda, for example, explained how students “labor over the writing so much—spelling, that kind of thing—that they forget their ideas.” The challenge of students “remembering” during writing was a significant concern for the HS 2 teachers, and they decided the lesson needed to address this issue in order to be effective.

During this session, Dana found a graphic organizer in one of the resource books (Appendix J), and she used it with her class the following week. Although she could not attend the third professional development session, she told her group members the graphic organizer had worked well in helping students elaborate their writing, so the teachers came to the third lesson study meeting already planning to use a graphic organizer in their lesson. Thus, in the third and fourth sessions, the group discussed how to teach children to complete the organizer and write a composition from it. They decided this would require two lessons: one in which they modeled how to write phrases in the organizer and one in which they modeled how to write complete sentences from those phrases. They chose the second lesson, which focused on writing connected text, as the research lesson. Because the next writing unit in the curriculum focused on letter writing, the group decided to have students use the organizer to plan and write letters.

During the third professional development session, the teachers discussed the graphic organizer structure. They considered using the same organizer Dana had used, but Tracy wondered:

Will it confuse the kids using the same format of the organizer for a different [genre of writing]? We’re using the same and making a change. I think it might be confusing. I’m wondering if a different organizer [would be better].

The group then discussed how to restructure the organizer for letter writing. They decided it should parallel the parts of a letter, and they used the rest of this planning session to create the organizer on the computer (Appendix K).

During the fourth session, the teachers outlined the lesson sequence. They had a lengthy discussion about how to model writing from the graphic organizer. Linda contended that the teacher should model how to write the letter, taking phrases from the organizer and putting them into sentences. However, Celia thought this teaching method would not sustain children's attention. She argued the lesson needed to be "more interactive" because "[children will be] done observing this halfway through." She contended students should suggest sentences, based on the information in the organizer, to include in the letter. The group decided to use this strategy to more actively involve the children in the lesson.

As the teachers discussed the lesson sequence, Linda began typing the lesson plan into the four column chart provided on the LPT (Appendix B). However, after a few minutes, she decided the chart was "too confusing." The group simplified it, and they created a new chart with three columns: "Teacher Activity," "Things to observe," and "Notes from observation" (Appendix L). Linda typed the lesson sequence into the "Teacher Activity" column, and when it was complete, the group discussed what observers would examine during each lesson step. They decided they wanted data about (1) whether students faced the teacher and listened during the review of the graphic organizer, (2) whether they participated in the think-pair-share about sentences to include in the letter, (3) whether they read the letter aloud with the teacher, and (4) whether they used proper letter format, complete sentences, and elaborated sentences in the letter they

wrote independently. Linda typed the observation criteria into the chart, and at the end of the session printed it for each group member.

Between the fourth and fifth planning sessions, Tiffany taught the lesson to her class while Celia and Dana observed, and Tracy taught the lesson to her students while Linda observed. The lesson plan as the HS 2 group typed it included the following sequence of teacher actions:

Meet at rug and review the graphic organizer

Ask students to help formulate sentences from graphic organizer in to letter. Do a Think-Pair-Share. Call on a few students to share. Teacher records sentences on paper.

Reread letter to show it flows

Facilitate letters from graphic organizers

Figure 2: HS 2 Research lesson plan

During session five, the group discussed the research lesson using the debriefing protocol (Appendix I). They agreed the children “were all engaged” during the lesson and that the “think-pair-share” and lesson format worked well. However, Tiffany found it difficult to synthesize the different suggestions children made into single sentences when she demonstrated the letter writing. To avoid this problem, the group agreed the letter should be written either about a “common experience” such as a field trip or something the children had done together in class or should be written by the teacher alone.

In addition, Linda noted that some children in her class struggled to transfer the ideas in the organizer to their writing. Rather writing complete sentences, these students

copied the phrases directly from the organizer into their letters. Dana also commented how some children did not write in the proper letter format. These observations led the teachers to conclude they might need “a middle step,” between the graphic organizer and the letter writing itself, to address how to put the ideas from the organizer into complete sentences and the correct letter form. The group decided to revise the lesson by having students write phrases onto the organizer, then write sentences beneath the phrases, then write the letter from those sentences.

During the sixth professional development session, the group created a new graphic organizer that provided space for children to both write their ideas in phrases and write sentences from those phrases. The group hypothesized this organizer would facilitate the “transition” between writing ideas in the organizer and writing sentences in the letter. Between this planning session and the next, Linda taught the lesson to her class while Tracy observed. However, as noted in the previous section, the final professional development session at Hillside was cancelled due to the unexpected death of a faculty member. Therefore, the HS 2 group did not discuss what occurred during the revised research lesson.

Lesson Study at Deer Valley Elementary School

Eight participants at Deer Valley completed the lesson study professional development. During the initial professional development session, the teachers set a lesson study goal of helping students “know how to begin writing” once a writing task had been assigned. They chose this goal because they had noticed that their students struggled to generate an initial sentence to open their compositions. The teachers wanted to provide the children with some specific strategies for “starting” a piece of writing.

The teachers decided to work in two lesson study groups, and each participant chose the group she wanted to join. One group designed a lesson for kindergarteners, while the other planned a lesson for second graders. Each group met with its respective members during professional development sessions two, three, and four. Both groups met together during the fifth session to debrief the kindergarten research lesson, and both met together again during the sixth session to debrief the second grade lesson. The teachers chose to do this so that each group could learn about the lesson planned and taught by the other. During session seven, the groups worked separately to consolidate their lesson study reports. The work of each group is described in detail in the following two sections and summarized in Figures 3 and 4 at the end of the chapter.

Kindergarten lesson study group. Three kindergarten teachers and the reading teacher formed the kindergarten lesson study group at Deer Valley (DV K group). The kindergarten teachers included Carol, who had taught kindergarten at DV for 16 years; Jodie, a special educator and second-year kindergarten teacher at DV; and Rachel, who had taught at DV for seven years but in kindergarten for only two years. The reading specialist, Donna, had worked at DV for eight years and taught struggling readers in both a pull-out setting in her classroom and in their regular education classrooms.

Carol, Jodie, and Rachel attended the second professional development session and, because Carol was the most experienced kindergarten teacher in the group, Jodie and Rachel began the discussion by asking her how she taught writing. Carol described her general approach to writing instruction, explaining what her students did at various points in the writing process and how she supported students at each stage. Jodie and Rachel also discussed writing assignments they had given their students, but both expressed

uncertainty about their teaching. Jodie commented, “I’m a second year teacher, so writing’s by far my weakest point.” Rachel concurred, indicating that, “I don’t know how to approach [teaching writing]. I’m not sure.”

During this session, the group also discussed the questions on the LPT, and Jodie took notes on the form. They determined they wanted their students to focus on details in their writing, use descriptive words, be creative, write for different purposes, and be self-motivated writers. However, they believed students were currently mechanical, unmotivated, and reluctant writers who lacked the experiences, skills, and language they needed to write well. Jodie related this discussion back to the lesson study goal, asking:

Jodie: How can they start [writing] if they lack experience, they lack the language, they lack confidence, they lack being self-motivated? How are they ever going to start? We have to help them with all of these things before they can even think about writing.

Carol: I know.

Jodie: So how do we do that? How do we even get to that point? How do we improve their lack of experience? Improve their lack of language?

The group engaged in a lengthy discussion to answer these questions and generated a variety of potential ways to address the issue. By the end of the session, they had decided students should write about their personal experiences and have opportunities to talk about their stories before they wrote them. They also agreed that the teacher should model how to write a sentence.

During session three, the DV K group worked on planning the research lesson. They began by discussing possible writing topics around which to focus the lesson. After an extensive conversation about potential topics, they decided to have students write about a special person in their lives. They reasoned that all the children would be able to

think of an important person and generate ideas about that person. During this discussion, they decided to begin the lesson by reading aloud the book *Just Grandpa and Me* (Mayer, 2001) and to then ask students to discuss someone special to them. The group then began to outline the sequence of the lesson, and Jodie wrote their ideas in the lesson plan template embedded in the LPT. They generated a sequence of teacher actions that Jodie recorded in the first column of the template, discussed what they expected students to do at each point in the lesson (column two), and the materials they needed (column four). Once the lesson plan was complete, they discussed the points they wanted the lesson observers to notice and evaluate (column three).

In the fourth session, the group finalized their lesson plan and to finished the points to notice and evaluate. They first reviewed the lesson plan, clarifying it and adding details. They then engaged in a lengthy discussion of the data observers should collect and what might constitute evidence that students were learning from the lesson. As they grappled with how to collect evidence of student learning, the teachers found it difficult to describe exactly what observers should notice and evaluate at each point in the lesson. They resolved this dilemma by creating four categories about which observers should take notes: *active listening*, which would occur throughout the lesson; *sharing*, the part of the lesson in which students talked to each other about their special person; *interactive writing*, the part of the lesson in which the teacher demonstrated how to write about a special person; and *independent writing*, the part of the lesson in which each student wrote about their special person. The teachers created a “four square” chart, separate from the lesson plan template, which provided a space for observers to take notes in each of the four categories.

Between the fourth and fifth sessions, Carol taught the research lesson to Rachel's class while Rachel, Jodie, and Donna observed. The general outline of the lesson, based on how I recreated it from the transcripts of the group's first four planning sessions, was:

1. Read the book *Just Grandpa and Me* aloud to the class.
2. Ask students to think of a special person and talk about that person with a partner.
3. Ask three or four students to share with the whole class what their partner said.
4. The teacher describes to the class a person who is special to her.
5. The teacher draws of picture (on chart paper) of her special person while thinking aloud about the details they will include in the picture.
6. The teacher writes a sentence (on chart paper) about her special person while modeling how to sound out words and put spaces between words.

During the fifth professional development session, the teachers reflected on the lesson. Because the other lesson study group wanted to hear about this lesson, the groups combined for the lesson debrief. Following the debriefing protocol (Appendix I), Carol first shared her impressions of the lesson, and then Jodie, Rachel, and Donna shared their observations. The group identified many ways that the lesson positively impacted the students: students seemed extremely engaged and interested in the lesson, they answered Carol's questions correctly, each child successfully chose a special person and talked about that person with a partner, and each child included details about his or her special person in their pictures. The teachers attributed these successes to how Carol modeled what students should do at each point in the lesson:

Jodie: She did the modeling. It was all about her modeling. Right from the beginning. "This is how we're going to sit, this is how we're going to listen, this

is how our eyes are going to be.” Right from the beginning she was modeling for them, and I think that’s what really worked. And then right down to the drawing. “Okay, we have a head. Do our legs come out of our head? No.” She modeled every step.

Donna: She was very detailed about what her expectations were. In other words, you weren’t just going to draw a circle and that was going to be your illustration. She talked about all the body parts—They’re floating in the air, you want to show there’s some ground. So her expectation was that your illustration has got to have a lot of details to it.

J: Yeah, I think the modeling is key in the lesson. I think that if you had just said, “Okay, we’re doing this” or just made a stick figure, then that’s what they’re going to do. If you didn’t put effort into what you’re doing, why would they put effort into what they were doing?

The only drawback identified by the group was that, because the lesson exceeded the 45 minutes they had allotted for it, the children did not have enough time to finish writing the sentences about their pictures.

Through the discussion, the teachers realized that Carol had added important aspects to the lesson that were not written in the lesson plan. For example, at the beginning of the lesson, she gave a concise overview of what students would do and her expectations for how they should engage in the lesson, though this was not included in the written plan. The group also discussed Carol’s enthusiasm as she taught the lesson and reflected on how her demeanor seemed to motivate the students. They decided her excitement contributed the lesson’s success, though this was not an element of the research lesson the group had specifically planned. They also discussed how the read aloud book seemed to engage the students, and they considered the contribution of a well-chosen book to the lesson’s success. The group decided that they would plan another lesson and attempt to specifically embed in it the elements that they believed had contributed the current lesson’s success.

During the sixth professional development session, the DV 2 group debriefed their research lesson, and the DV K group decided to join them. Thus, they did not have time to design another research lesson based on the ideas they generated during session five. During the final professional development session, Carol and Rachel were absent, so Donna and Jodie consolidated the group's notes and typed the final lesson study report (Appendix C).

Second grade lesson study group. The second grade lesson study group at Deer Valley (DV 2 group) included two second grade teachers, a resource teacher who taught first and second grade special education students, and the RF reading coach. Nora, a second grade teacher, had taught special education at another school for five years prior to coming to DV, and during the professional development she was in her second year of teaching second grade at the school. Ellen, also a second grade teacher, began teaching second grade at DV only a few weeks before the professional development course began. She had “taken over” another teacher's class when that teacher took a leave of absence during the middle of the school year. Mandy, a special educator, had worked as at DV for two years as resource teacher, teaching small groups of first and second grade special education students throughout the day. The final group member, Dorothy, was the RF coach, and she had decided to work with this group so she could lend her expertise to these less experienced second grade teachers.

Dorothy was absent from the second professional development session, so Ellen, Nora, and Mandy discussed the questions on the LPT, and Mandy took notes. They decided that they wanted their students to be excited about writing, to express their thoughts and feelings on paper, to write without using a story starter, and to include more

details in their writing by using descriptive words related to the five senses. However, they believed students were currently unmotivated to write and prepared for the writing demands of future grades. They also noted that the children seemed to write at a low level, without using even basic capitalization and punctuation.

As the group discussed why their students seemed to struggle with writing, Ellen raised the question, “Is it better for them to draw a picture and then to write about it, or make them write it first and then do the picture?” This question sparked a discussion about how to best structure a writing lesson and about whether teachers should assign writing topics or allow students to choose the own. By the end of the session, the group had decided that they would ask students to draw first and then write about their picture. They also agreed that they would assign a broad topic—holidays—and allow students to write about anything that fell within that topic’s parameters.

The group began the third session by summarizing for Dorothy what had taken place during the previous meeting. Dorothy questioned whether students would “connect” with the topic *holidays*, which led to a lengthy discussion about whether they should change the writing topic. The group considered some alternative topics, but finally decided that *holidays* would work reasonably well. They then began to plan what would occur during the lesson and discussed a wide range of issues: how to help students choose a holiday to write about, how to help students include details in their pictures, how and when to give students feedback about their picture, how many sentences they should expect students to write, how to help students write a main idea sentence about their picture, whether to use a graphic organizer to help students generate ideas for writing, and how much time they should allot to each part of the lesson. Mandy recorded the

group's ideas in the lesson planning template, completing columns one, two, and four. Because the lesson was lengthy, the group also discussed how to section it into different lessons that would be taught over several days.

During the fourth session, the group reviewed their lesson plan and their expectations for the writing students would produce during the lesson. As they discussed each part of the lesson, they clarified what would occur, made modifications, added to the list of materials needed, and discussed what observers should notice and evaluate during the research lesson. Dorothy recorded their ideas on the lesson plan template. The group also created a rubric that outlined their expectations for what students would include in their picture.

Because the group wanted to participate in the DV K group's debrief during session five, they did not discuss their lesson again before Dorothy taught it between the fifth and sixth professional development sessions. Dorothy taught the same lesson two times on the same day: once to Ellen's class and once to Nora's class. In Ellen's classroom, only Ellen observed Dorothy teach. In Nora's classroom, Nora, Ellen, and Carol (a DV K group member) observed the lesson. Based on the transcripts of the group's planning, the general outline of the lesson Dorothy taught was:

1. Cluster children into groups of three or four and give each group a card with the word *holiday* written on it.
2. Ask students to discuss the meaning of the word *holiday* and to share their holiday experiences.
3. Ask groups to share with the whole class what they discussed.

4. Read aloud *Nothing Ever Happens on 90th Street* and discuss how the author included details in the writing.
5. Show students the picture rubric and discuss how it will be applied to their pictures.
6. Model how to draw a picture of a holiday experience.
7. Ask students to draw a picture about their holiday experience.

Because their research lesson was lengthy, the group had sectioned it into two parts. The day after she taught the first lesson, Dorothy returned to Ellen's and Nora's classes to teach the second lesson. Ellen and Mandy observed the second lesson in Ellen's classroom, and Nora and Mandy observed the second lesson in Nora's classroom. The general outline of the second lesson was:

1. Return students' pictures graded according the picture rubric.
2. Explain why revising the picture is important.
3. Ask students to revise their picture based on the feedback they received on the rubric.

During the sixth professional development session, the teachers reflected on the research lessons. Because Carol, a member of the DV K group, had attended the first lesson presentation and wanted to share her observations, the groups combined for the lesson debrief. Using the debrief protocol (Appendix I) as a guide, Dorothy first shared her impressions of the lesson, and then Ellen, Nora, Carol, and Mandy shared their observations. Dorothy's main critique of the lesson was that the book, *Nothing Ever Happens on 90th Street* (Schotter, 1999), had confused students because it did not relate to the holiday discussion that occurred before she read it. The other teachers agreed.

Mandy, who had not attended the first research lesson, commented that, “I wasn’t in there, but I could see why [students were confused]. First we were talking about holidays, then all of the sudden we’re not talking about it anymore.” The group decided that the lesson would work better if, following the book reading, the children wrote about what happened in their neighborhood, which was the topic of *Nothing Ever Happens on 90th Street*.

Despite the students’ confusion over the writing topic, the group was extremely pleased with students’ responses to the picture rubric. Dorothy described what happened when she handed back the children’s pictures and asked them to revise:

Their self-reflecting in Ellen’s room was one of the greatest things I’ve ever seen. Those kids, grabbing those pictures and going back and making it better. I thought that was one of the nicest things I’ve seen. It’s very hard to get kids to want to fix things up. And they knew exactly how to do that after getting back their picture. I loved that they got that out of it.

As they discussed this part of the lesson, the group determined that giving students feedback on their pictures, explaining the importance of revising the pictures, and giving them an opportunity to change their pictures all contributed the success of the second research lesson. The kindergarten teachers decided that their students would also benefit from a picture rubric, and the group discussed how a rubric for kindergarteners might differ from one for second graders.

During the final professional development session, the DV 2 group discussed and consolidated their notes. They typed the final lesson study report (Appendix D), including the information that emerged from this discussion.

Chapter Summary

This chapter described the district and the schools in which the lesson study systems operated and the lesson study systems themselves. First, I described Hillside Elementary and Deer Valley Elementary, the writing curriculum available in the schools, and the study participants' perceptions and use of that curriculum. I then described each element that constituted the lesson study systems: the lesson study process, the artifacts and ideas available to the lesson study groups, and the lesson study group members. I detailed how the lesson study process at Hillside and Deer Valley differed from how it occurs in other settings, and I explained why those differences occurred. In addition, I provided a chronological account of how each lesson study group operated throughout this research study. Figures 3 and 4, below, summarize the lesson study groups, each group's participants, and how each group conducted lesson study.

Group	Teachers	Position/Grade Level	Years in Current Position
Hillside Kindergarten (HS K)	Courtney	General education teacher/K	20
	Martha (Sessions 3-6)	Reading specialist	15
	Mary	Special education teacher/K & 1st	2
	Kristen	Teaching assistant/K	5
	Sharon	General education teacher/K	4
	Tonya	General education teacher/K	11
Hillside 2nd grade (HS 2)	Celia	Special education teacher/3rd & 4th	7
	Cynthia (Sessions 1 & 2)	General education teacher/2nd	14
	Dana (Sessions 1, 2, & 5)	General education teacher/2nd	11
	Linda	General education teacher/2nd	10
	Martha (Sessions 1 & 2)	see above	see above
	Maureen	Teaching assistant/1st grade student	5
	Tiffany	General education teacher/2nd	5
	Tracy	Special education teacher/2nd	10
Deer Valley Kindergarten (DV K)	Carol	General education teacher/K	11
	Donna	Reading specialist	8
	Rachel	General education/K	2
	Jodie	Special education/K	2
Deer Valley 2nd grade (DV 2)	Dorothy	Reading First coach	2
	Ellen	General education teacher/2nd	1
	Mandy	Special education teacher/1st & 2nd	2
	Nora	Special education teacher/2nd	2

Figure 3: Summary of lesson study groups and participants

		Professional Development (Lesson Study) Session									
Group	Lesson	1	2	3	4		5		6		7
HS K	Drawing and labeling a picture and writing an elaborated sentence about the picture	plan	plan	plan	plan	teach research lesson	debrief & revise lesson	teach revised research lesson	debrief & discuss possible lesson changes		cancelled
HS 2	Using a graphic organizer to write a letter	plan	plan	plan	plan	teach research lesson	debrief & revise lesson		revise lesson	teach revised research lesson	cancelled
DV K	Drawing and writing about a special person	plan	plan	plan	plan	teach research lesson	debrief & discuss possible lesson changes		participate in DV 2's debrief		write report
DV 2	Writing about holidays	plan	plan	plan	plan		participate in DV K's debrief	teach research lesson	debrief & discuss possible lesson changes		write report

Figure 4: Summary of professional development sessions by group

Chapter Five – Knowledge Generation within the Lesson Study Systems

This chapter addresses the research question, *How did the lesson study systems enable and constrain the knowledge about writing instruction that emerged through them?* Although the term “enable” carries a positive connotation and the term “constrain” a negative one, complexity theory asserts that both enablers and constraints are necessary to knowledge production (Cilliers, 2005; Davis & Sumara, 2006). In order for a system to generate knowledge, it must maintain a balance between “an unexplored space of possibility” (Davis & Sumara, 2006, p. 148) and a coherence that prevents chaos within that space. Randomness, openness, and disruption of initial ideas within a knowledge producing system prompts new, unanticipated insights, and overly rigid constraints can stifle this process. However, a system without constraints lacks the order needed to generate meaningful ideas. Davis and Sumara use the term “enabling constraints” (p. 147) to describe the optimal balance between possibility and coherence within a complex system.

As the lesson study systems progressed at Hillside and Deer Valley, each system experienced instances of over constraint, under constraint, and enabling constraint. Over constraint occurred when a lesson study group closed off possibilities too quickly and limited the knowledge generated. In contrast, instances of under constraint occurred when a group generated too many possibilities without the focus needed to form useful and interpretable knowledge. At these moments, randomness overtook coherence within the lesson study systems, and too little direction existed for meaningful knowledge to emerge. Finally, there were many instances of enabling constraint. On these occasions, an

optimal space of possibility emerged, and the lesson study groups produced clear, meaningful, useful knowledge about writing instruction.

As described in chapter three, the lesson study groups rarely generated ideas that fit the definition of knowledge set forth in chapter two of this dissertation. In chapter two, I developed two criteria for knowledge: a claim qualifies as knowledge if (1) it fits within and across the nested systems in which it exists and (2) the person making the claim can demonstrate that fitness. While this definition and its criteria are epistemologically sound, in practice the lesson study participants seldom provided evidence about the fitness of their claims. This created a dilemma because, according to this definition of knowledge, the groups generated very little knowledge that could be analyzed to answer the research questions.

The differences between the definition of knowledge that guided this study and the knowledge the lesson study groups produced suggest that knowledge can be viewed through multiple lenses: epistemological, empirical, and practical. As noted above, the definition of knowledge developed in chapter two was epistemologically sound and well theorized. However, it was not very useful empirically, in that it hindered rather than facilitated data analysis in this study. Furthermore, it was not very useful in practice, in that teachers generated many ideas—ones they found valuable in their teaching—that did not fit this definition of knowledge.

Given the limitations of the epistemological lens on knowledge, I chose to use an empirical-practical lens to guide data analysis. Because the lesson study groups generated numerous ideas that were useful to them and potentially to other teachers, I chose to analyze everything the groups produced. As a result, the findings in this chapter account

for all the ideas, concepts, examples, and information the groups generated throughout the lesson study process. Admittedly, empirical and practical views of knowledge are not well theorized, although this study may provide a starting point for such theorizing. Whether the ideas generated by the lesson study groups can be considered knowledge will be further discussed in chapter seven.

Over Constraint in the Lesson Study Systems

Over constraint occurred in the lesson study systems during (1) the groups' discussions and (2) some of the classroom teaching experiments. One example of over constrained discussion is DV 2's conversation at the beginning of the lesson planning process. Both DV groups chose a lesson study goal of helping students know how to begin a composition, and during the second professional development session, DV 2 discussed the questions, "Why does the gap between our aspirations and reality exist?" and "How do we close this gap?" from the Lesson Planning Tool (LPT, Appendix B). This led DV 2 to discuss reasons children did not know what to write:

Mandy: Maybe [writing] is just harder than reading because they have to put their own ideas on the paper. You have to think more. And some kids don't want to do that.

Ellen: Some kids can't think for themselves.

Nora: Their background, home life. Their lack of confidence. Lacking confidence, but they just are flat. Flat-lined, you know? They aren't given any opportunity to be creative in any way. At home.

Mandy: If it's not a priority at home...

Nora: I don't think they understand the concept of being creative. "What do you think?" And they don't know what thinking is, and coming up with things.

Vicki: So when you say, "What do you think?" they say, "I don't know."

Nora and Mandy: Yeah, yeah.

Ellen: They don't have imagination. They don't have imagination.

This discussion was over constrained because it converged quickly on the children's innate characteristics and out-of-school experiences as reasons for their struggles with writing. The group generated an explanation that students lacked confidence, creativity, and imagination because they had no opportunity to be creative at home. While this explanation was viable—that is, based in one logical interpretation of why students did not know what to write—it was not useful within the lesson study process. It severely constrained the knowledge that could be generated about writing instruction because, if students' writing struggles stemmed from a lack of imagination at home, there was little the teachers could do about it. The group generated an explanation that obscured the useful possibility that instruction could improve students' writing.

At this point, the DV 2 group's discussion came to a halt because it was unclear how to move forward with lesson planning if students' difficulties were due to experiences teachers could not change. After a few moments of silence, Ellen attempted to overcome this over constraint by suggesting:

Ellen: I think they've just been asked to grow up so quick that they don't have an imagination. I feel like that to be a kid—They're not allowed to be a kid.

Nora: One of my students never went to school before the middle of 1st grade. So he's had no exposure, no socialization. They don't get to do it anymore with the other kids because they send them to school right at [age] three, and there's no more playtime. It's all academics. And so they don't get a chance to be creative. Because that's what the socialization was all about.

These data demonstrate how over constraint continued in DV 2's discussion despite Ellen's new idea. While still focused on students' lack of imagination, Ellen and Nora suggested in-school factors, rather out-of-school factors alone, contributed to

students' lack of creative writing. They argued school did not allow children to be "a kid" because the academic emphasis interfered with opportunities to be creative. However, this explanation, like the previous one, attributed students' writing struggles to factors beyond teachers' control, which again closed off the possibility the group could address the issue. Consequently, over constraint continued in DV 2's discussion.

Over constraint within this discussion resulted in too few useful possibilities. The teachers focused on student and systemic reasons for the children's struggles rather than instructional reasons. As a result, they did not consider the possibility they might be able to *teach* students to be imaginative and generate ideas for writing. In an effort to introduce this idea, I commented to the group:

Have you guys heard about the Language Experience Approach? You do something with the kids that would be interesting, maybe a science experiment or even something outside. And then they come in and they write about the experience. Because that's a place to get the ideas.

This comment eased the instance of over constraint by prompting the group to discuss instructional possibilities for addressing the lesson study goal. Nora had used the Language Experience Approach in the past, and she described how her students drew a picture of a field trip and then wrote about it. This prompted Ellen to ask, "Here's another question, about this whole picture thing. Is it better for them to draw a picture and then to write about it, or make them write it first and then do the picture?" After a lengthy discussion about the pros and cons of drawing before writing, the teachers decided if children drew about an experience, it might help them think about what to write, and they began to design the research lesson around picture drawing followed by writing. Thus, as the teachers discussed instruction, a factor they could manipulate in the research lesson,

new and useful possibilities opened up. The availability of new possibilities ended this instance of over constraint, and the group moved forward with its lesson planning.

A second, similar instance of over constraint occurred when the DV K group discussed the gap between its current and ideal student writers:

Jodie (Reading from LPT): Why does the gap between our aspirations and reality exist? How do we close this gap?

Rachel: Why does it exist? Because there's no...

Jodie: Lack of support at home?

Carol: Okay, lack of support at home. Lack of knowledge... (Looks up, apparently thinking).

Rachel: It's not just home, though.

Carol: No, it's school. Lack of support at school. It's also...

Rachel: Lack of consistency...? (Looks around, apparently thinking).

Carol: Lack of consistency between grades. But it's also support because we're being told we need to do it, but when are you doing it?

Rachel: Time.

Carol: Time. If children are having difficulty, there is no...

Rachel: The focus is on reading and math.

Carol: And really, writing and reading should be tied together. And they aren't.

Like the DV 2 group, the kindergarten teachers explained students' writing struggles through lack of support at home and school. They contended the school's emphasis on reading and math left little time for teaching writing, and that reading and writing weren't "tied together" as they should be. This discussion, like the one in DV 2, limited the knowledge that could be generated about writing instruction. However, as the conversation continued, Rachel suddenly asked Carol, "So your writing [instruction], do

you still do it first thing in the morning?” Carol described how she taught writing, and the teachers decided to model the research lesson after Carol’s instructional format. In contrast to the previous example, where I introduced an instructional idea into DV 2’s discussion to overcome over constraint, this example from DV K demonstrates how the teachers themselves ended over constraint by introducing new and useful possibilities for the research lesson.

It is notable that both these instances of over constraint occurred around the LPT question “Why does the gap between our aspirations and reality exist?” This question was designed to elicit the instructional deficits that led to students’ writing difficulties so teachers could plan a research lesson that addressed students’ learning needs. However, both groups engaged the question through the lenses of student and school deficits, which inhibited the generation of knowledge about writing instruction. The LPT question, then, for the DV groups, closed off useful interpretations rather than opening up possibilities as it had been designed to do.

While the two previous examples demonstrated how over constraint emerged in the groups’ discussions, over constraint may also have occurred throughout three groups’ classroom teaching experiments. In HS 2, HS K, and DV K, the teachers designed the research lessons without considering alternative possibilities. The HS 2 group, for example, decided to use a graphic organizer as a way to help students elaborate their writing, but they did not discuss if this was the best instructional technique to accomplish that goal or if other possibilities might work better. During the second professional development session, Dana found a graphic organizer in one of the resource books, and she used it with her class the following week. Although she did not attend the third

planning session, she told the others in her group that the graphic organizer worked well, and she encouraged them to use it. Thus, the teachers came to the third lesson study meeting already planning to implement an organizer in their research lesson, and they did not discuss alternative approaches to helping children elaborate their writing.

Like HS 2, the DV K and HS K groups designed research lessons without discussing alternative lesson formats. Both groups began the planning process by asking their most experienced member, Carol in DV K and Courtney in HS K, to explain how they taught writing. Each group then adopted the lesson format that teacher described. Although they discussed many alternatives around the details of implementing the lessons, the basic lesson structures remained unexamined. Notably, both groups used similar formats—students drew a picture, labeled it, and wrote about it—even though each group had a different lesson study goal.

Designing the lessons without considering alternatives constrained the knowledge about writing instruction that could emerge from the lesson study process. As groups focused on a single lesson idea, they left other possibilities unexplored. Agreeing so quickly to a lesson structure preempted opportunities to generate the pros and cons of different ways of teaching writing—knowledge that might have been useful for the knowledge base.

Every lesson study group experienced instances of over constraint during their planning discussions, and, as described above, HS K, DV K, and DV 2 experienced over constraint in how they designed the lesson that served as their classroom teaching experiment. In each instance, over constraint occurred when the “space of possibility” (Davis & Sumara, 2006, p. 148) became too narrow. The knowledge generated became

so focused around a particular idea—children come to school unprepared, schools do not provide the time and conditions needed for writing, the lesson will include a graphic organizer, the lesson will include drawing then writing—that other, potentially more useful, knowledge could not emerge. Over constraint closed off possibilities, and the discussions and lessons quickly converged around a single idea, which limited the number and scope of ideas generated through the lesson study systems.

In some instances, over constraint also limited knowledge generation by halting the lesson planning process. When the DV groups focused their discussion on student and school-based reasons for the children's writing struggles, it was impossible to continue the lesson planning because the teachers could not impact students' out-of-school experiences or the systemic roadblocks to writing instruction. Thus, over constraint within the lesson study systems hindered the very process designed to generate knowledge about writing instruction.

Under Constraint in the Lesson Study Systems

While over constraint resulted from a too narrow focus within the lesson study systems, instances of under constraint emerged from lack of focus. Focus is necessary in a knowledge producing system because it allows divergent ideas to cohere into interpretable patterns (Davis & Sumara, 2006, p. 148). Too many possibilities, too much randomness, and too little coherence under constrains a system and interferes with its ability to generate meaningful, useful knowledge. Within the lesson study systems, under constraint occurred both in the group discussions and in the classroom teaching experiments embedded in the lesson study process.

Under Constraint in Group Discussions

Under constraint in the lesson study discussions occurred when groups generated so many ideas that they became overwhelmed with information. In the following paragraphs, I explain how under constraint emerged as one group, HS 2, produced a wide range of ideas about their research lesson. Martha began the planning session by reading from the LPT:

It says “What kind of writers do we want to see develop at our school? What kinds of writers are actually being developed? What evidence do we have for that? Why does the gap between those two things exist? How do we close it? How will the lesson study goal we have chosen help us close this gap?” That’s probably—If we come up with a goal, that would be really good. “How will we go about exploring our lesson study goal?” So, our lesson study goal, then.

[Silence from the group].

Reading the questions, one after another, from the LPT introduced a large number of ideas into the lesson study group. Teachers were asked to compare ideal and current student writing, consider reasons this gap existed, examine ways to close the gap, and articulate how the gap and lesson study goal related to one another. This conversation occurred in the second professional development session, one week after the HS K and HS 2 teachers had discussed these questions as a whole group and had chosen the lesson study goal of teaching students to elaborate their writing. The purpose of discussing the questions again was for each group to reiterate and extend its initial ideas and record them for the lesson study report. This professional development session also began with a conversation reiterating the gap and the goal, but the HS 2 group did not seem to connect these experiences with the questions on the LPT. Martha even commented that “If we come up with a goal, that would be really good,” indicating she did not realize the goal referenced by the LPT was the one she and her group members already developed in the preceding discussions.

Notably, the LPT questions, which over constrained the DV K and DV 2 groups, under constrained HS 2. These questions and the previous discussions had been designed to bring focus and direction to this part of planning process, but they did not work as anticipated. As a result, Martha's reading of the questions seemed to overwhelm the group. Numerous ideas flowed into the lesson study system through these questions, and with nothing to direct teachers' interactions with the ideas, too many possibilities for response existed. The process became so under constrained that group did not know what to do.

After Martha finished reading, the group sat in silence for 30 seconds, unsure how to proceed. The discussion continued when Martha prompted the group for a response. However, as the following example demonstrates, under constraint continued in the discussion as the group continued to generate a large number of unconnected ideas:

Martha: Our objective?

Dana: A final product? From the minilessons?

Martha: Each minilesson—over a one day period.

Tracy: To provide numerous opportunities for the children to practice targeted skills before moving on to...

Cynthia: So we need multiple minilessons on the same skill...

Martha: What I would like to see happen is, once you feel they have got it, you've done it enough that they really should be accountable in the future for that.

Cynthia: So having a checklist, or some kind of paperwork in their writing folders so that when you conference with a child, you can immediately look and go, "Oh, yes. This kid does have this, so I can make this demand on this child." So finding a paperwork management system that works. To let you know where each child is.

Tracy: But a lot of kids need to be shown that it can be incorporated into their other writing. Because they only know it in this setting. Now they have to be shown how to do it. And then expected.

Martha: So that gets from fiction to nonfiction as well. It cuts across the rest of the day.

Tracy: I think another area where we're dealing with a gap is, whatever skills were taught in writing, I think you have to target them in speaking as well. Because that's the only way they're really going to get it.

Martha: Target in speaking, but also to try to target in reading too. If you're talking varied vocabulary, you're actually finding them in the reading.

Tracy: Right. There's just so many more opportunities to model and give kids opportunities to practice in speaking than there are in writing.

During this discussion, the teachers generated numerous ideas related to writing instruction. The group wanted to teach a minilesson each day, but because students needed many opportunities to practice the same writing skill, multiple minilessons on the same skill were required. Martha argued that once a student had mastered a skill, he or she should be accountable for using it in future compositions, which led Cynthia to suggest a "paperwork management system" to track what each student could do. However, Tracy maintained that children needed to be shown how a writing skill transferred from one setting to another before teachers could expect them to use it consistently. Martha interpreted Tracy's teaching suggestion as a way to help students "get from fiction to nonfiction" so they could use the writing skills they learned in language arts "across the rest of the day." In addition, Tracy then introduced the idea that teachers connect writing skills with oral language. Martha agreed and added that writing skills should also be addressed in reading. She gave the example of teaching children to use "varied vocabulary" and argued they should "find" varied vocabulary while reading. Tracy then reiterated and extended her initial point, saying that teachers have more

opportunity to model skills and children more opportunities to practice skills in speaking than in writing. Thus, through this discussion, the HS 2 group generated many different ideas about writing instruction.

While generating a large variety of ideas, in itself, does not necessarily under constrain a knowledge producing system, something within the system must direct those ideas into a meaningful pattern (Davis & Sumara, 2006). The LPT was designed to direct the discussion toward hypotheses about student learning. However, it failed to adequately do so, and no other system element—the teachers, the facilitator, the ideas available to the group, or the lesson study process itself—brought sufficient focus to the group’s conversation. As a result, the discussion lacked direction. The group was unclear about what to discuss and what to accomplish, which led them to veer through a wide variety of ideas that did not cohere around any particular goal or topic.

Under constrained lesson study discussions resulted in groups generating too many divergent ideas. The HS 2 group produced a series of loosely connected but discrete ideas about writing instruction: multiple minilessons, students held accountable for writing skills, a paperwork management system, children writing across different situations and genres, and connecting writing with speaking and with reading. Moreover, because the group’s discussion meandered from topic to topic, these ideas were not often elaborated. For example, Tracy suggested connecting writing and speaking, and Martha suggested connecting writing and reading, but aside from Martha’s contention children could “find” varied vocabulary while reading, no one generated information about how writing/speaking or writing/reading instruction could or should occur. The group also contended students needed multiple minilessons on each writing skill, but they did not

explicate how to create different lessons on the same topic or link them together.

Similarly, while Cynthia suggested a “paperwork management system” to track students’ writing skills, no one described such a system, how it would work, or how teachers could initiate it. From the standpoint of building a knowledge base for teaching writing, this discrete and minimally elaborated knowledge was limited in meaning and difficult for other teachers to use.

Generating discrete information also made it difficult to capture the knowledge produced in a way that it could be represented in the knowledge base. As the group talked, Martha diligently took notes, but she was unable to record the details of teachers’ comments. She created the following list during the conversation (Appendix M):

- Each minilesson will have a one day product
- Link skills from one day to another
- Multiple minilessons on same target skill (elaboration) with time to practice after each minilesson [“(elaboration)” was added later in the discussion].
- Less is best
- Kids don’t get it the first time
- Some form in folder for FCA [Focus Correction Areas]
- Paperwork management system
- Transfer of writing skill across the day
- Fiction to non-fiction
- Teach and observe in pairs
- Skills in writing—target in speaking and reading

This list included each topic addressed by the group, but, unsurprisingly, it lacked the detail generated during the discussion. Martha could not feasibly record everything the teachers said, and abbreviated notes about minimally elaborated ideas produced a list with limited meaning and utility for the knowledge base.

Just as the LPT questions overwhelmed the HS 2 group at the beginning of the discussion, the information the group itself generated overwhelmed it now. After Tracy's comment "There's just so many more opportunities to model and give kids opportunities to practice in speaking than there are in writing," the group again sat silently. They had discussed so many different ideas that it was unclear how to coordinate and utilize them in the research lesson. Without something to direct these ideas into a single lesson plan, too many possibilities for action existed, and the group did not know how to proceed.

In an apparent effort to restart the discussion, Martha began reading the LPT questions aloud to the group:

Martha (Reading): "How has the lesson study goal we have chosen"—I don't know if we're ready to write our goal. "Overview of context." We can skip that for now if you want...

[Martha looks over the LPT silently. The group sits silently for over one minute. Group members look at one another, appearing unsure what to say].

Martha: (Motioning to Vicki to come to the group's table). Vicki, what's the best place to start with these questions?

Martha's reading of the LPT questions introduced yet more ideas into a lesson study system already inundated with uncoordinated possibilities. Martha herself seemed overwhelmed by the questions, as she did not attempt to answer them as she read and called me to the group to ask for guidance.

As is evident from the previous examples, up to this point DV 2's discussion had been extremely under constrained. However, Martha's query, "What's the best place to start with these questions?" marked a turning point away from under constraint. Note, in the following example, how my response to Martha's question narrowed the group's possibilities for action and focused their planning process:

Vicki: Let's focus in on the specific student learning piece. If we're going to think about elaboration, the goal we chose earlier—In the category of elaboration, what kind of writers do we want to have? What we want them to be able to do with elaboration? And then the second thing, what are they doing now? And then, how do we bridge that gap? And that's going to help us figure out what we're going to teach.

Cynthia: So saying that we want our kids to write page long pieces that have lots of pertinent details, and currently they write bare bones pieces that barely scratch the surface of the topic.

Vicki: Right.

Cynthia: And the gap is what's between those two.

Vicki: Exactly. The idea here is that we're shooting for a target and we have no idea where the target is. So part of what we want to do here is think about "What is our target?" Now, not our target for all of writing. That's too big. We've decided to focus on elaboration. Within elaboration, what's our target? So what Cynthia said would be part of that target.

To begin functioning again, the HS 2 group needed to narrow its possibilities for action. The teachers had generated broad ideas about writing instruction, including multiple minilessons, accountability, and a paperwork management system. While this knowledge might have been useful for teaching writing generally, it was difficult to focus it into a single research lesson. My suggestion that teachers "focus in on the specific student learning piece" eliminated these broad ideas from consideration and reduced the number of ideas available for use in the research lesson. I also reminded the teachers they had chosen the lesson study goal of teaching children to elaborate their writing, and I

encouraged them to identify target skills “within elaboration.” Focusing on elaboration would allow them to exclude possibilities unrelated to the purpose of the research lesson.

Another aspect of narrowing possibilities for action involved reducing the range of topics available for discussion. I reiterated the lesson study process, telling the group to discuss (1) the kinds of writers they wanted to have, (2) the students’ current writing skills, and (3) how to bridge that gap. Focusing on these three questions, rather than the myriad others that could be addressed, would significantly reduce the scope of ideas teachers could generate. At the same time, by condensing this part of the lesson planning into three overarching ideas, I reduced the amount of information that required attention. The LPT asked the group to address the same three issues, but it did so through six questions. Now, rather than contending with six distinct questions, the group had only three central ideas that needed discussion.

Narrowing the HS 2 group’s possibilities for action, both within the research lesson and within the planning process itself, seemed to provide the focus needed for the teachers to reengage in the lesson study process. As they returned to their discussion, Martha said to the group, “We want to build a lesson from our objectives. Our main goal is for kids to elaborate their writing. So what is our specific lesson?” The group went on to describe the elaborated writing they wanted students to produce and to discuss how to help students generate it.

This example from the HS 2 group demonstrates how under constrained discussions led to disparate, unelaborated ideas that held limited meaning and usefulness for the knowledge base. Each lesson study group experienced similar moments of under constraint, but each instance varied in degree. The HS 2 discussion became severely

under constrained, as did some of the discussions undertaken by other groups. However, at other times, instances of under constraint were quickly refocused. At one point in the DV K group, for example, the teachers discussed the read aloud book that would launch the lesson and how to organize students to talk about the book with a partner. Then

Donna commented:

Donna: To get in more writing, but a different kind of writing, what if you had chart paper and had the kids sitting in front of the chart and you did a shared writing where they could start telling you different things and you could put those words up on the chart and record it.

Rachel: Well, I was thinking like a bubble map, just to think of who's special in your family.

Jodie: Well, we're talking a lot about other things we're going to do outside of this lesson. I think we need to do the lesson, and then if we want to do stuff around it. But let's take care of this (motioning toward paper in front of her) first.

Carol: So we'll read the book.

Jodie: And after we're done reading... (Continues to explain how students will discuss the book with a partner.)

Donna and Rachel, like the HS 2 teachers, generated ideas peripheral to the emerging research lesson. Jodie identified these ideas as “outside the lesson” and asked the group to set them aside until the lesson itself was planned. As a result, unlike the HS 2 group, DV K immediately eliminated divergent instructional approaches and refocused the discussion on the ideas already generated—the read aloud and book discussion. Jodie's comment functioned as a focusing agent in the same way my comments had with the HS 2 group. By prompting the teachers to exclude the chart and bubble map, Jodie constrained her lesson study group's discussion.

Under Constraint in Classroom Teaching Experiments

Under constraint in the lesson study discussions led to under constraint in the classroom teaching experiments embodied in the lesson study process. These under constrained teaching experiments shifted over time and therefore lacked clear connections between hypotheses about learning, the lesson design, the data collected during the lesson observation, and the data analysis. Without these connections, the lesson study groups struggled to generate meaningful, unambiguous knowledge about how instruction impacted student learning.

Three of the lesson study groups—HS K, DV K, and DV 2—experienced under constraint in their classroom teaching experiments. In the following paragraphs I trace how it emerged in one group, HS K. While the specifics of each group’s teaching experiment differed, under constraint operated similarly in each one, and therefore HS K represents how the teaching experiments became under constrained as the groups planned them.

During the second professional development session, Courtney shared some writing her students had done, noting they included details in their drawings that they didn’t include in the sentences they wrote. For instance, one student drew a window that looked out onto a tree and wrote, “I like looking out a window.” Courtney commented that the child could have elaborated the sentence by including information about the tree pictured through the window. After making this observation, Courtney suggested that having students draw a picture and label it might facilitate their ability to write more elaborated sentences:

For kindergarten, wouldn’t it be appropriate to, after they label their picture—which I think is a little bit easier for them to do, write one word—and then we somehow teach them to take some of that labeling and bring it down into their sentences.

Courtney drew an explicit connection between the goal of the lesson study group, to help students add more details to their writing, and the instructional approach she proposed. She hypothesized that because labeling a picture was easier for students than writing an entire sentence, it could act as an intermediary step between the drawing and the sentence writing. She reasoned that once students labeled their pictures, teachers could help them to use the words they wrote as labels to write a detailed sentence. The group liked this idea and decided that drawing and labeling a picture would become a part of the lesson.

Courtney then showed the group other examples of student writing and further explained her thinking about the instructional approach she had proposed:

Courtney: We're just trying to teach the kids to begin to label things. I want them to label stuff, and then maybe take the labeling and make details from what they already drew in their picture.

Martha: So first picture, then label, then...

Courtney: I'm thinking, "What could we do to add details to their picture?"

Mary: Right. So what I've done, on the board, is you draw a picture and then you say, "What do you see? A snowman. There is a snowman". Then I go, "Tell me more about the snowman."

Courtney: So you're still taking it back to their picture...

Mary: That's right.

Courtney: ...to get more details.

Mary: You've got to take it back to their picture.

Courtney began by reiterating her idea that students "take the labeling" to "make details" for their sentence. However, by posing the question, "What could we do to add details to their picture?" Courtney also introduced the idea that a detailed picture might facilitate a detailed sentence. This new hypothesis seemed to fit with Mary's teaching

experiences, and as she described how she taught writing, Mary emphasized the relationship between the picture and the sentence. Courtney explicitly stated that relationship, saying, “So you’re still taking it back to the picture...to get more details,” and Mary agreed that, “You’ve got to take it back to the picture.” As the discussion continued, Mary showed the group examples of her students’ writing and explained that she would ask students, “What else can you tell me about this picture?” in an effort to help them “build” a sentence from their picture.

This discussion shifted the emphasis from using labels to elaborate a sentence to using a detailed picture to elaborate a sentence. Mary’s teaching examples created a feedback loop (Davis & Sumara, 2006) through which picture-sentence relationship was amplified, and the idea that “You’ve got to take it back to the picture” became more influential in the lesson design than the idea of using labels. The group did decide to include labeling as a part of the lesson, but the lesson plan (Appendix G, Step 8) directed the teacher to emphasize how students could use the picture, rather than the labels, to get ideas for their sentence.

As the lesson shifted, the teaching experiment became under constrained. The shift from Courtney’s initial suggestion—that students use the labels to elaborate their sentences—to her second idea—that students use details from their pictures to elaborate sentences—redirected the group and prevented them from testing the hypothesis that labeling would facilitate elaborated sentence writing. Although the students did label the picture (Appendix G, Steps 3 and 4), because those labels were not used in the sentence writing (Step 8), the hypothesis was not embedded in the lesson. As a result, the teaching

experiment did not generate knowledge about whether labeling pictures would help students write elaborated sentences.

At this point in the planning process, the lesson consisted of each student drawing and labeling a picture and writing an elaborated sentence based on the picture. As the HS K group continued planning, though, the emphasis shifted from teaching students to elaborate their writing toward teaching them to draw and label a picture. This shift occurred in response to Kristina's concern that some students might not understand how to label. She contended that, "where our kids are right now—if we don't do it in large group, I am individually going to be going to every single one and explaining what labeling is." In order to address this concern, the group decided to create a "pre-lesson" that would be taught before the research lesson. In the pre-lesson, the teacher would guide the class to collaboratively draw and label a picture so that the children would understand the concept of labeling. Once the pre-lesson had been taught, the research lesson could then address how to elaborate sentences based on the pictures students drew.

However, as the planning progressed, the group decided to teach the pre-lesson as the research lesson. This decision shifted the research lesson goal because the pre-lesson had been designed to teach students to draw and label a picture rather than write elaborated sentences. Although the teachers never explicitly stated the research lesson goal had changed, elaborated writing was not listed in the objectives on the final lesson plan (Appendix G). Instead, the second objective, "Students will be able to draw and label a class drawing," reflected the new goal that emerged as the pre-lesson was planned.

The shift in the research lesson goal again changed the focus of the classroom teaching experiment. Because the lesson now aimed to teach students to draw and label a

picture, the teaching experiment produced knowledge about how to facilitate drawing and labeling rather than how to help children write elaborated sentences. The *Observation Recording Sheet* (Appendix H) created by the HS K group instructed the observers to gather data about “Were the students able to draw and label the picture?” During the lesson debrief, the teachers concluded that the children had successfully drawn and labeled a picture during the lesson.

The discussion about the pre-lesson also raised the question of whether students should write the picture labels or whether the teacher should model how to label. Martha suggested the teacher label, but Kristina and Tonya were unsure. Martha asked Courtney’s opinion, which prompted the following discussion:

Courtney: You would write a sentence underneath, drawing from the details of your picture. The teacher would model that, I think. And you could be thinking out loud, “Oh, yeah, I’ve got to put a space between—My next word, I need a space there.” Because you’re doing so many levels of things when you’re writing with your kids. Word spaces, phonetics, you know.

Martha: So when you have the teacher write a sentence, do you ask a child for a sentence?

Courtney: I don’t know. What do you guys think? If we’re teaching them this, to take from their picture...

Martha: Then you could say, “Tell me one thing you see from the picture.”

Courtney: And then we could elaborate on it, help them...

Martha (Writing): And then the teacher writes it and talks about spacing...

This conversation brought sentence writing and elaboration back into the lesson.

Courtney’s comments, while addressing Martha’s question about whether the teacher should model how to write, also reiterated the group’s earlier idea about teaching students to use details from the picture in their sentence. Up to this point, the pre-lesson-turned-

research-lesson included only the class drawing and labeling a picture, but this discussion prompted the teachers to insert writing an elaborated sentence (back) into the lesson plan.

However, adding sentence writing to the plan did not revert the lesson to its original—that is, before the pre-lesson—state. Originally, the teachers had planned to have each child draw, label, and write a sentence based on their picture. At this point, though, the lesson had evolved, via the pre-lesson, to whole group instruction. As a result, there was no place in the lesson for students to write individual sentences, so the sentence writing became a teacher demonstration of writing (Appendix G, Step 8).

From the standpoint of the classroom teaching experiment, having the teacher demonstrate elaborating a sentence prevented the lesson study group from testing their hypothesis that students could draw on details from the picture to add details to their writing. Because the students only observed the teacher writing, the research lesson observers could not gather evidence about whether the children learned to use the picture details to write sentences. Therefore, the hypothesis remained untested, and the teaching experiment did not generate knowledge about whether a detailed drawing would help students write elaborated sentences.

At the same time that the lesson shifted toward whole group instruction focused on drawing and labeling, it also shifted toward an emphasis on the content of a “read aloud story.” This emphasis evolved in response to a comment Mary made during the planning. In describing her writing lessons and her students’ work, she had indicated that she read a book to the class and asked students to draw their favorite part. Once Mary had finished her explanation, Kristina asked the group, “So you guys just want to read a book

and base it on a book, then?” This was the first point in the conversation that reading aloud had been explicitly suggested, and the idea was incorporated into the lesson:

Martha: We’re going to start with the read aloud.

Mary: Start with a read aloud. Then you ask them to draw a picture of what they liked best about the story.

Kristina: Well, I think after they label it, you want to talk to them and they have to verbally—

Mary: Oh, you want them to label it, okay. So read a book, draw a picture, label it...

Kristina: And if they label it, I think we should talk to them, and then they’re verbally saying, out loud. You know, something from the story, so then they’re saying it out loud, so when they sit down [pointing to brain] it’s fresh.

Martha: So group discussion there. About story elements, maybe? The main characters, the setting.

Mary: So we’re going to do a read aloud, group discussion of characters?

This conversation introduced the content of the read aloud story into the lesson plan. Up to this point, the lesson had centered on drawing, labeling, and sentence writing, but adding the read aloud prompted Kristina’s suggestion that students talk about “something from the story.” Martha specified “something from the story” by suggesting a discussion of story elements, which brought the notion of story content into the lesson.

As the planning continued, the idea of story content evolved into the idea of accuracy between the story and the picture students drew:

Tonya: Now, we’re going to have some students that are going to want to alter somebody else’s picture. Is there going to be a rule that you can’t draw on somebody else’s picture but you can add something else...?

Martha: You could add something nearby, wouldn’t you say?

Mary: Yeah, you could say, “If there’s something missing.” Because they may say, “That’s Peter carrying a stick,” and I say “Why? I don’t see a stick. Can you

point it to me?” And they go, “Oh!” And someone says, “I’ll draw it.” And let them get up there and draw it.

Kristina: And we can keep referring to the book, too. Like, “Oh, well this is what he looks like here, does it look the same as what you drew?”

Mary: After they were done with their picture and their labeling, and I just go, “Refresh your memory, can anybody tell me what this is about, or read the sentence?” And I go, “Let’s see if we can find it in the book. And then let’s see”—compare and contrast.

Courtney: That’s great for comprehension.

Martha: I’ll write that down [on the lesson plan].

Courtney: “Find it in the book that tells me that.”

Mary: Right. Compare and contrast.

This discussion extended the idea of discussing story content into the notion that the picture *match* the story content. Notably, this shift evolved in response to concern about managing the lesson rather than a concern about the lesson’s instructional effectiveness. Tonya indicated students might “want to alter somebody else’s picture,” which led Mary to a logical way to address the issue: allow students to change the picture only “if something’s missing.” This comment implicitly introduced the idea of accuracy between the story and the drawing. Kristina made the idea explicit by suggesting the teacher “keep referring to the book,” Mary made it more explicit by proposing “compare and contrast,” and Courtney made it more explicit still when she suggested they ask students to, “Find it in the book that tells me that.” Through this series of comments, the notion of “add something [to the picture]...if there’s something missing” evolved into the notion of accuracy between the story and the picture.

As Courtney noted, through this discussion reading comprehension emerged as important, and elements of it were enfolded into the lesson. The final lesson plan

included “a group discussion about the book,” (Appendix G, Step 2) in which the teacher could monitor and refine students’ understanding of the story. Step five of the lesson also indicated the teacher should “Continue drawing and labeling and adding details [to the picture] *until you have the main points of the story on paper*” (emphasis added). Thus, a new, additional research lesson goal had emerged: ensuring students correctly understood the story and drew a picture that accurately reflected the story’s main ideas. The first objective listed on the final lesson plan, “Students will be able to orally give details about the story,” reflected this new emphasis on the read aloud story’s content and, implicitly, students’ accurate understanding of it.

This new research lesson goal, like the emerging goal of teaching students to draw and label a picture, changed the focus of the classroom teaching experiment. Because the teachers wanted the children to correctly understand the story, the lesson observers gathered data during the book discussion about, “Were the [students’] responses accurate?” (*Observation Recording Sheet*, Appendix H). During the lesson debrief, the observers indicated that the children had given accurate answers to the teacher’s questions about the story and that, in addition, they had drawn a picture and dictated sentences that were related to the story. Thus, the data collected demonstrated the children were able to meet this new lesson goal.

Throughout the HS K group’s planning, the lesson goal shifted several times, which in turn shifted the research lesson design and the classroom teaching experiment the lesson embodied. These shifts occurred because the planning process was under constrained. Similar to the under constrained discussions, in which too many uncoordinated ideas overwhelmed the conversation, too many uncoordinated ideas

overwhelmed HS K's classroom teaching experiment. At different points during the planning process, the group planned for children to draw a detailed picture, label the picture, use the labels and the details from the picture to write elaborated sentences, listen to a read aloud story, provide accurate details about the story to include in a group drawing, discuss with a partner a sentence about the story, and watch the teacher write a sentence about the group drawing. Although including a wide variety of ideas in a research lesson does not necessarily under constrain the classroom teaching experiment, those ideas must form a particular pattern—lesson goals connected to hypotheses about instruction connected to the instructional moves in the lesson—in order to generate knowledge about how teaching impacts student learning. The HS K group's lesson, however, did not exhibit this pattern of connectedness.

Because the lesson goals changed throughout the planning process, it was difficult to know what the instruction was supposed to accomplish. Research lesson goals do evolve as lesson study groups plan them (Fernandez & Yoshida, 2004), but the HS K teachers did not actively eliminate one goal and adopt another. Instead, the goal shifted in ways not explicitly articulated by the group. As a result, the teachers lost track of the lesson's purpose, which interfered with planning a lesson that would accomplish a specific, identifiable goal.

Ambiguity about the research lesson's goals led to a fragmented instructional plan. As the goals shifted, the group abandoned previous goals and hypotheses, but the related instructional moves remained in the lesson. Labeling, for example, was part of the lesson even though the hypothesis connected to it—that using labels would help students elaborate sentences—was not included. Thus, labeling served no instructional purpose

because the teacher used only the picture, not the labels, to generate the sentence she modeled. Similarly, although the lesson shifted away from sentence writing, it retained the step “Teacher will model writing the sentence below the picture. Think out loud about how you can elaborate the writing by noticing another detail in the picture to write about” (Step 10). However, this instructional element was not connected to drawing and labeling the “main points of the story” (Step 6) because the picture did not need the story’s main points in order for the teacher to model how to write an elaborated sentence about it.

Even as the lesson retained instructional elements related to eliminated goals, new goals remained disconnected from the lesson plan. For instance, the goal “Students will be able to orally give details about the story” had no instructional moves to support it. Children were simply asked to provide details about the book, and the teachers never generated a hypothesis about how the lesson might teach this skill. Similarly, nothing in the lesson instructed students in how to “draw and label a class drawing” (Objective 2). The teacher merely asked the children to draw and label on the chart paper. While there seemed to be an assumption the teacher would prompt students as needed during the drawing and labeling, the group never hypothesized how the lesson steps would teach students to draw and label the picture.

Under constraint in the classroom teaching experiments led to knowledge that was ambiguous and difficult to interpret. Without clear hypotheses about how particular lesson components should lead to the lesson goals, the HS K group could not attribute student learning to the instruction. The teachers concluded during the lesson debrief that students (1) gave accurate answers to the teacher’s questions about the story and (2) drew and labeled a picture and dictated sentences that were related to the story. However, there

was no way to know how the lesson influenced these outcomes. The lesson contained no instructional elements designed to teach reading comprehension or teach students to draw and label, so it was possible the children achieved these goals by using their prior knowledge and experience. Thus, the unconnected ideas within the classroom teaching experiment resulted in ambiguity about how the lesson led to student learning.

Under constrained classroom teaching experiments also led to knowledge that was only peripherally related to writing instruction. As HS K's lesson goal shifted, the instructional plan moved from writing elaborated sentences to drawing and labeling a picture and then toward reading comprehension. By the end of the planning process, the lesson required minimal writing; a few children wrote single word labels on the class picture. Beyond that, the lesson addressed writing instruction implicitly—in that drawing a detailed picture may be a prerequisite for writing a detailed sentence. However, the classroom teaching experiment embedded in this research lesson addressed writing instruction only in a marginal way.

The HS K, DV K, and DV 2 groups each experienced under constraint in their classroom teaching experiments. This occurred because nothing in these lesson study systems facilitated the creation of strong, ongoing connections between lesson goals, hypotheses about teaching, and the instructional plan. In Japanese lesson study, teachers plan from the national *Course of Study* (Lewis, 2002), so they begin with lessons that have specified goals and related lesson plans with embedded hypotheses about instruction. However, the writing curriculum available to the DV and HS groups provided goals but no plans for accomplishing them. As a result, the teachers had to create these sophisticated connections as they planned the lesson. Given the difficulty of that task and

the groups' inexperience with lesson study, it is unsurprising the classroom teaching experiments became under constrained.

At the same time, the LPT, the facilitator, and the lesson study process itself did not facilitate the patterns needed in the teaching experiments. The LPT chart for recording the lesson steps (Appendix B) aligned elements horizontally, connecting each teacher action with anticipated student thinking, what observers should evaluate, and the materials needed. It did not support the creation of vertical connections across the lesson, that is, from beginning to end. In addition, because I facilitated two groups simultaneously during each professional development session, I did not realize how under constrained the lessons had become. I had assumed the lesson study process itself would adequately guide teachers' planning, but it did not. Thus, nothing within the lesson study systems created the constraint needed for successful classroom teaching experiments.

Notably, during the lesson debriefs, the HS K and DV 2 groups realized their research lessons included too many divergent ideas. As HS K discussed how they would change the lesson, Martha commented:

Well, I thought the lesson was great, and I think if we rewrite it that—we had so many main objectives. That to write a new lesson in such a way that maybe this time your main focus is on the story elements, or this time it's on the labeling. Because I think we were trying to do it all, all at once.

The group concurred, and Mary added, “I just think we probably had too many goals set and did not realize it.” While the teachers interpreted the under constraint as “too many goals” rather than goals that shifted, they recognized the lesson contained elements that attempted to accomplish different things. Furthermore, Mary's comment, that the group did not “realize” how many goals they set, indicates a dawning awareness that they lost track of the lesson goals during the planning process.

The DV 2 group also realized they included too many diverse ideas in their lesson plan. Dorothy, who had taught the lesson in both Ellen and Nora's classrooms, began the debrief by stating, "There was a huge disconnect between the idea of your favorite holiday and reading to them about getting ideas, details. I just felt, as I was teaching—I drew it together the best I could, but..." The lesson had begun with the students discussing their favorite holiday, but then Dorothy read a book on a different topic. The purpose of the book was to demonstrate ways to "find" ideas for writing, but the teachers did not realize in advance the "disconnect" between these two instructional moves. Now, though, Mandy pointed out:

Mandy: I didn't observe the lesson, but I could see why—First we were talking about holidays, then all of the sudden we're not talking about it anymore.

Dorothy: You weren't even there, and you're saying, "What the heck are we doing?"

Mandy: So maybe—so would you have read that book first? And then went into your idea?

Dorothy: I would have skipped the connect completely. Two different lessons.

This conversation demonstrates the DV 2 teachers' emerging recognition that the different lesson elements lacked connection. Similar to the HS K group, these fragmented instructional moves occurred in response to shifting lesson goals. As the debrief continued, it became apparent the DV 2 group had lost sight of their lesson study purpose. Like HS K, they had planned lessons to lead up to the research lesson, and the purposes of those lessons conflated. In fact, confusion about the lesson goal grew so severe, I finally asked Dorothy about it:

Vicki: What was your goal? For the lesson you ended up teaching.

Dorothy: I don't know.

Ellen: Our goal was to make the kids motivated and engaged. To write. To start. That's what our goal was.

Dorothy: Yeah, when we sat down, four weeks ago.

Ellen: That was one of them. And I would say that for our lesson, we achieved that.

Carol: And I think part of the reason that you achieved it was because of you. Because you were very...

Ellen: Animated.

Carol: You were animated, you were energetic. Everything that you did, you were excited.

Dorothy: But the only thing that bothers me is, we wanted to get them motivated to write, not just to listen to me.

Dorothy's statement, "I don't know," made evident how unclear the lesson goal had become. She could no longer identify what they intended the lesson to accomplish, and she indicated the lesson purpose had shifted during planning from what it was "when we sat down, four weeks ago." She also pointed out the disconnect between the instructional moves and the original lesson study goal: "We wanted to get them motivated to write, not just listen to me." As the discussion continued, the teachers agreed they needed a clearer goal to create a lesson that did not confuse students.

Both the HS K and DV 2 groups began to identify how under constraint affected their research lessons and, implicitly, their classroom teaching experiments. This suggests that in future lesson study work, the teachers might be able to better organize the teaching experiments embedded in their research lessons. The HS K group, in particular, indicated that if they planned another lesson, they would focus on a single learning goal, which would lead to clearer knowledge about how the lesson components impacted students'

learning. Thus, with experience, a lesson study group might be able to act as an agent of constraint on its own teaching experiment and generate unambiguous knowledge about how to teach writing.

Enabling Constraints in the Lesson Study Systems

In contrast to over constraint, in which too few possibilities existed within the lesson study systems, and under constraint, in which too many divergent possibilities existed, instances of enabling constraint occurred when possibilities cohered into meaningful patterns. In these instances, the lesson study groups simultaneously elaborated and focused ideas about writing instruction. As with under constraint, enabling constraint occurred both in the groups' discussion and in their classroom teaching experiments.

Enabling Constraint in the Group Discussion

Instances of enabling constraint occurred in the lessons study discussions when groups simultaneously expanded and connected ideas. For example, the DV K teachers discussed the writing topic for their lesson:

Carol: One of the topics I was thinking, maybe, because this is Black famous American month, February, so I don't know if we could do something based on a hero or someone...

Rachel: It's too bad we did that ecology thing already because I wanted to do that.

Carol: So we could do...a fame—They wouldn't...a famous person or someone that they admire.

Donna: Do they know what that means, though, a famous person? Would they understand that?

Carol: A person for Valentine's Day.

Jodie: Yeah, that's a good point about would they understand the whole famous part.

Carol: Well, they would do their mother [as a famous person].

Donna: Maybe if prior you could talk about, maybe give them different names and just show them a category of some sort. I'm just wondering, if you say to the kids "Let's write about a famous person" if they know what a famous person is.

Carol: Well, it could be their parents, someone that they know...

Uncertainty about what to choose as the lesson's writing topic prompted teachers to expand on their ideas by generating rationales and alternatives. Carol initially suggested children write about "a famous person," but Donna and Jodie provided a reason this topic was problematic: students might not understand the concept "famous" well enough to write about it. As "famous person" emerged as unsuitable, Carol offered "Valentine's Day" as an alternative, though the group ignored her comment. Carol also introduced "mother" and "parents" as potential topics when she indicated the children would choose to write about their mothers or their parents if asked to write about a famous person. Thus, uncertainty about the lesson's writing topic prompted the group to generate both alternatives and reasons why different possibilities would or would not work.

While uncertainty prompted DV K to generate divergent ideas, this discussion did not become under constrained. As the discussion proceeded, the group continued to generate possible topics, but they also made connections between the different ideas.

Carol: Well, it could be their parents, someone that they know...

Jodie: Someone that is special. A lot of my kids would pick somebody who is in music. A lot of them really enjoy music, so ...

Donna: So what about, with Valentine's Day—When you were saying Valentine's Day, I was thinking, what if they did a writing assignment about someone who's very special to them that they would want to share something, you know, with the whole involvement with Valentine's Day.

Carol: They could create a Valentine's card and then inside they could put why they think the person's special. And they could draw a picture or something. But no, we couldn't do that because we won't be doing this lesson until after Valentine's.

Rachel: Yeah. Mom, I love my mom.

Jodie: Yeah, but it's still fine. People are special just because, and kids always draw their families and they're always special, and you can give them something like that in the middle of the year...

Carol: It could be "Why I love you."

Jodie suggested the topic "someone that is special," while Donna suggested children write in relation to Valentine's Day. Although these two ideas are, in some respects, divergent, Donna connected them: "What if they did a writing assignment about someone who's very special to them...with the whole involvement with Valentine's Day." Carol reiterated the connection, saying, "[Students] could create a Valentine's card and then inside they could put why they think the person's special." Rachel, too, implicitly connected Valentine's with special person. She suggested students could write, "I love my mom," which related Valentine's Day to a person students might consider special. Her statement also connected to Carol's earlier contention that students would choose their mother if asked to write about a famous person.

Generating connections between these different ideas helped the DV K group constrain this discussion. Jodie's suggestion that students write about "someone that is special" and Donna's suggestion that the writing relate to Valentine's Day represented divergent possibilities. The Valentine's Day idea could have taken the discussion in a different direction if, for example, someone had proposed students write about the holiday in a general way. However, Donna, Carol, and Rachel each connected

Valentine's Day and special person, which focused the discussion around a limited set of writing topics and prevented the teachers from generating too many disparate ideas.

Even as the DV K group generated alternatives, rationales, and connections, Jodie's statement, "People are special just because," so "you can [write about a special person] in the middle of the year" both elaborated a rationale for and explicitly defined the writing topic. Carol had suggested the Valentine's Day-special person topic might not work because the lesson would occur after February 14th. However, Jodie contended children's families are "always special," so students could write about them beyond Valentine's Day. At the same time, her comment also served to separate *special person* from Valentine's Day, and *special person* was explicitly defined as a topic unto itself. Thus, clarity emerged within the discussion about what children would write during the lesson, and this coherence provided direction for the discussion.

Clearly defining *special person* as the writing topic provided boundaries for the discussion, allowing enabling constraint to emerge in the midst of many different ideas about potential writing topics. The two examples below, which occurred as DV K's conversation continued, demonstrate how the ebb and flow of generating and bounding possibilities sustained enabling constraint in this discussion. Note how the group generated rationales for writing about a special person, then generated rationales for other writing topics, then finally rejected some ideas while actively choosing others:

Rachel: Why my mom is special. She takes care of me, she feeds me, she takes me to school, she helps me with my homework. There's lots of ideas.

Jodie: They like to write about their family too.

Carol: Well, that's something that they know about.

Rachel: Draw a picture of your mom, you know, that would be easy to do.

Donna: That goes along with motivation, when you find something that is close to their heart, they're more motivated than saying "Why don't you write about..." (Motions to the air).

Rachel: A sports figure or whatever. Especially at this age, their mom is something that...

Donna: Grandma's bringing them up, or mom is bringing them up, then that's special to them.

The teachers generated a series of reasons *special person* would work well as a topic, including why it was better than the famous people topic they discussed earlier: families are "close to [children's] heart," which is more motivating than writing about "a sports figure of whatever." At this point, though, Carol brought up another possibility:

Carol: The other thing which you had talked about, the ecology part, we could do something like "I will take care of the Earth. This is what I'll do" type thing.

Jodie: We could do a Valentine's theme, we could do a recycling theme because that's kind of big right now, it's what we're working on.

Donna: The recycling theme, you could ask them to choose one thing that they remember, one thing that they think is important about recycling. Whether it's recycling paper, or picking up the trash.

[Discussion of the lessons they already taught related to recycling].

Jodie: I feel like it would be more creative if they were talking about their families.

Carol: Yes.

Donna: That's something they know.

Jodie: They know it, they feel comfortable with it, they're more apt to write about it.

Rachel: This would appeal to [children at] all the levels. Everybody can write about their mom.

Carol: Or they can write about grandma.

Jodie: Or their dad.

Although the discussion had converged around *special person*, Carol referred to Rachel's earlier comment about ecology. In this case, rather than constraining the discussion, connecting to a previously generated idea opened up new possibilities. The teachers discussed these options for several minutes, but they decided the children's writing "would be more creative if they were talking about their families" rather than ecology-related themes. Thus, the group explicitly rejected ecology as a writing topic and chose *special person*, which re-clarified what the children would write about during the lesson. However, discussing ecology as a potential topic also prompted the group to generate more reasons why *special person* was superior: children "know" the topic, they are comfortable with it so they are more apt to write about it, it would appeal to children at all skill levels, and "everyone" can write about it.

At the same time, the DV K group also constrained their discussion by ignoring some of the comments teachers made. At the beginning of this conversation, Carol suggested "Black famous Americans" and "hero" as potential writing topics, but no one commented on these ideas, and Carol did not mention them again. Donna suggested the teachers "give [students] different names [of famous and non-famous people] and just show them a category of some sort" to help children understand the concept "famous person." However, no one acknowledged this remark, and Donna did not pursue the idea. In addition, toward the end of this discussion, Jodie reintroduced Valentine's Day as a topic, but the group discussed ecology instead. Ignoring these comments reduced the number of divergent ideas within the discussion, which constrained the conversation and prevented the group from becoming overwhelmed with too many different ideas.

Enabling constraint allowed the DV K group to generate clear, elaborated, and useful knowledge about topics for writing. Through this discussion, knowledge emerged about several possible topics—famous people, Valentine’s Day, ecology, and special person—as well as rationales about each topic’s suitability for these children during this lesson. From the standpoint of building a knowledge base about writing instruction, the DV K group generated knowledge both elaborated and focused enough to be meaningful and useful to other teachers.

Another example of enabling constraint occurred in the DV 2 group. Ellen, Nora, and Mandy reviewed their lesson plan for Dorothy, who was absent during the previous planning meeting. They described how the children would draw a picture and write about a holiday, and Dorothy questioned “holidays” as a writing topic. Like DV K, enabling constraint emerged in this discussion through a combination of uncertainty and ignoring some extraneous ideas. However, notice how Dorothy also constrained the discussion by synthesizing disparate ideas:

Dorothy: Does holiday take on the same connotation for all kids? I don’t know. Some kids don’t have that experience.

Nora: I just think it would be something that they all have in their head. Is some kind of a memory of something. They all have some kind of memory of something that happened.

Dorothy: I know that for it to be meaningful—For them to have a lot to write, and for it to be motivating, it’s got to be something that they connect to. They have to have a connection to it.

Nora: There’s kids that will be creative. It won’t be true.

Dorothy: Yeah. But you also want to—That’s why I’m thinking I like the idea of bringing literature into it so that you can put them all on the same page somehow. Using literature to motivate.

Nora: We did our unit on friends. (To Ellen): Do you remember doing that unit? Best friends and stuff.

Dorothy: That's something they can all connect to.

Nora: I've already done it. I had the kids write about their best friend. It's taken me weeks.

Dorothy: Why do you think?

Nora: They just aren't into it. And I told them what the four sentences have to say. I do the four square paragraphs.

Ellen: Some of them say they don't even have a friend. They don't even have a best friend.

Dorothy: It just sounds like these are kids that you have to give a lot of—They're not knowing where to even draw stuff from.

Mandy (To Ellen): You were doing friends when I was in there, and they were saying "I don't have friends" or "I don't do anything with my friends. I go outside."

Dorothy: They don't know where to draw from to write.

As in the DV K group, uncertainty about the lesson plan led DV 2 to elaborate rationales and present evidence to support their reasoning. However, unlike DV K, the uncertainty arose from disagreement between Dorothy and the rest of the group. Dorothy argued "holiday" was an unsuitable topic because it would not "take on the same connotation for all kids," but Nora contested this, saying "it would be something that they all have in their head...some kind of a memory of something." Nora and Ellen also described how the children did not write about their best friends, providing counter evidence to Dorothy's contention the topic was "something they can all connect to."

In addition, also like DV K, this group constrained the discussion by ignoring some extraneous ideas. Nora's statement that the children's writing "won't be true" and her description of the "four square" paragraph format were not acknowledged by the

other teachers. The group also ignored Dorothy's suggestion, "using literature to motivate" children to write. At the same time, though, another element also constrained DV 2's discussion: Dorothy's synthesis statements. These statements did not introduce new ideas per se, but instead synthesized the discussion. For example, after she and Nora argued for and against holidays as a writing topic, Dorothy said, "I know that for it to be meaningful—For [children] to have a lot to write, and for it to be motivating, it's got to be something that they connect to. They have to have a connection to it." Both she and Nora had implicitly argued this point, with Nora contending students would have "some kind of memory of something that happened [on a holiday]" and Dorothy saying "some kids don't have that [holiday] experience." Dorothy's second and third synthesis statements occurred after Ellen and Nora described how the children did not write about their best friends. She said, "It just sounds like these are kids that you have to give a lot of—They're not knowing where to even draw stuff from" and, a few moments later, "They don't know where to draw from to write." These comments summarized and synthesized what Ellen and Nora had said about student's struggles to produce a *best friend* composition.

Dorothy's synthesis statements focused the DV 2 discussion by converging the different ideas teachers generated. She articulated overarching concepts—students need a connection with the writing topic and they "don't know where to draw from to write"—from loosely related comments, which explicitly connected and made meaning from disparate ideas. While Dorothy's group members may or may not have agreed with these statements, the syntheses produced clarity for the lesson study group. Ellen, Nora, and

Mandy knew what the discussion meant because Dorothy told them. She created coherence out of divergent possibilities, which focused and directed the discussion.

Three of the lesson study groups included a person who periodically synthesized the group's discussion: Dorothy in the DV 2 group, Jodie in the DV K group, and Courtney in the HS K group. Their syntheses brought order to the myriad ideas generated by their group members. Interestingly, in the HS 2 group, no one functioned in the "synthesizer" role, and this group struggled more than any other to plan their research lesson. Because they seemed uncertain about what to do, I joined them for several planning sessions. Although I did not realize it at the time, analysis of the session transcripts indicated I took on the role of synthesizer in the HS 2 group.

Each lesson study group experienced many instances of enabling constraint throughout its discussions. In most of these instances, enabling constraint occurred through various combinations of the mechanisms present in the examples described above. Uncertainty or disagreement about the lesson plan prompted useful alternatives and rationales, while connecting ideas across the discussion, explicitly clarifying and defining the lesson elements, ignoring some extraneous comments, and making synthesis statements focused the discussion and prevented under constraint. However, in a few instances, enabling constraint also emerged through teachers' use of the LPT. The HS K group, for example, began their planning by working through the LPT questions:

Courtney (Reading from LPT): What kind of writers do we want to see develop at our school?

Kristina: Functional.

Tonya: Elaborate. Aren't we supposed to all be working on that elaboration piece? Right?

Courtney (Writing on the LPT): We want them to elaborate on their writing by...by what?

This instance of enabling constraint demonstrates how different elements within the lesson study systems worked together to create the conditions needed for productive knowledge generation. To an extent, the LPT both enabled and constrained the discussion by posing a question—What kinds of writers do we want to see develop at our school?—that invited elaboration yet provided some direction. Without this question, this discussion might never have begun or might have taken an entirely different direction. However, the way the HS K group interacted with the LPT allowed enabling constraint to continue to emerge. Courtney began by reading just the one question, which, in contrast to Martha’s reading of all the LPT questions in the HS 2 group, provided clear direction and boundaries for the conversation. In addition, Tonya reminded the group, “Aren’t we supposed to all be working on that elaboration piece?” This comment further clarified and narrowed what the group should discuss. Tonya’s comment led Courtney to restate the LPT question in terms of elaboration: “We want them to elaborate on their writing by...by what?” This question focused the discussion clearly on elaborated writing, but it was open-ended enough that teachers could generate multiple ideas about elaboration. Thus, through comments in response to the LPT, the group created enabling constraint.

As the discussion progressed, Courtney continued to create enabling constraint by pushing the group to expand and clarify the description of elaborated writing:

Kristina: We still want imaginative writers.

Courtney: By adding...(Motioning toward Kristina).

Kristina: Imagination.

Courtney: But are we talking...

Sharon: Adding details?

Courtney: But she said...imagination...ideas... (Pointing to Kristina, thinking)

Kristina: Creative?

Tonya: If I could get to something more than “I am a tree.” Just extending, adding more words.

Mary: Details.

Courtney: (Writing) Descriptive details?

Kristina: We want them to be creative.

Courtney (Reading from LPT): Be creative, when something their thoughts, when... (Gestures for others to help her expand idea). I mean, you want them to be creative, you want them to write their thoughts down, and not just “I was outside playing. I am a tree. I saw a monkey.”

Mary: To describe their pict—Well, in kindergarten, to describe their drawing in more detail, to use their imagination, to be more precise...at a K level.

Courtney: (Writing). To be more precise...

Courtney encouraged Kristina to extend her idea about imaginative writers, prompting her, “By adding...” and motioning for her to continue her idea. Courtney then asked, “But are we talking...” after which Sharon and Tonya suggested “adding details.” However, Courtney did not accept this answer as sufficient, and she pointed to Kristina, saying “But she said... imagination...ideas.” This prompted the teachers to add two other characteristics of elaborated writing: creative and “just extending, adding more words.” Then, a few moments later, Courtney said, “when something their thoughts, when...” and gestured for the others to help her think of the appropriate word for “something.” This ultimately led to Mary generate “precise” as a feature of elaborated writing.

Like the instances of enabling constraint in the DV 2 and DV K groups, uncertainty within HS K's discussion prompted teachers to generate alternatives. In this case, HS K generated alternative conceptions of elaborated writing, and one group member, Courtney, prompted uncertainty for the group. The other teachers responded to Courtney's uncertainty by extending their initial descriptions of how they wanted children to elaborate, which created an expanded definition of "elaborate writing." At the same time, though, Courtney's requests for more information also constrained the discussion because she asked about comments the teachers already made. She prompted them to extend the ideas already generated rather than produce new, potentially unrelated ideas. This focused the discussion around a limited set of ideas about elaboration, which prevented the discussion from becoming under constrained.

This example from the HS K group demonstrates how elements within lesson study systems can simultaneously enable and constrain groups' discussion. The way teachers interacted with the LPT created both space for them to elaborate ideas and boundaries that prevented disconnected ideas from overwhelming the group. Similarly, Courtney prompted the teachers to extend their notions of elaborated writing, but she also focused the discussion by asking for ideas related to ones already generated. Thus, an optimal "space of possibility" (Davis & Sumara, 2006, p.148) emerged through this discussion, and the group generated a meaningful description of elaborated writing.

Although uncertainty and disagreement prompted the lesson study groups to elaborate their ideas and generate alternatives and rationales, uncertainty was not required for enabling constraint. The DV K group, for example, was discussing "modeling" when Carol suddenly offered a rationale for having students share their ideas with the class:

Jodie: You're going to have to model first. They can use all the modeling they can get. Sometimes you can't get to all of them.

Carol: No, you can't always. But I do know, when you have a topic, a lot of times people have no clue what to write. But if you spend the time within the classroom, and you talk about it, I'll come up with what I want to do. And then you go around the room—"What do you think? What would you do? What would you do?" (Motions around the room). It takes time, but—and they think about it for a minute before they—"I can't think of anything. Well, we'll come back to you." But you learn ideas from other people.

Rachel: Yes.

Carol: When I'm writing something, it's like, "Oh my gosh, what am I going to write?" But I'm thinking...(leans over as if looking at another person's paper)... "Oh, that's neat, okay." And then I'm gone. (Motions writing). I can do it.

In this discussion, Carol spontaneously suggested a new instructional approach and a rationale for it. She argued that hearing others' writing topics could spark an idea for someone who didn't know what to write, and she offered evidence from both her classroom teaching and her own personal writing experience. The group agreed with her and incorporated students sharing their writing topics into their research lesson plan.

This episode from the DV K group demonstrates how enabling constraint could emerge through the ways teachers interacted with the lesson study process. Although nothing in the discussion directly prompted Carol to give a rationale for the teaching approach she proposed, the goal of planning a research lesson required teachers to generate instructional ideas, and in this instance Carol gave reasons for instructional choice. At the same time, she focused her comments around a single instructional idea, which generated a clear conception of the proposed teaching method and the reasons why it would work.

Moments of enabling constraint such as this one occurred in each lesson study group, though only occasionally. In these instances, none of the mechanisms identified

above—uncertainty, making connections, ignoring comments, synthesis statements, or interactions with the LPT—played a role in prompting enabling constraint. Instead, the teachers spontaneously elaborated and focused the ideas they generated in response to the task of planning the research lesson. Notably, though, these instances were always limited in scope. Teachers would make a few spontaneous comments that generated clear, meaningful rationales and alternatives, and then either uncertainty would arise again, allowing enabling constraint to continue, or the discussion would become over or under constrained. Thus, uncertainty, coupled with mechanisms that prevented groups from producing too many disparate ideas, acted as the driving forces of enabling constraint in the lesson study discussions.

Enabling Constraint in the Classroom Teaching Experiments

Enabling constraint emerged through the classroom teaching experiments when groups made connections between the lesson design and student learning. These connections occurred in two ways: through (1) embedding clear hypotheses with related instructional moves into the lesson plan and gathering data about how the lesson impacted student learning and (2) post hoc analysis of what occurred during the research lesson implementation. HS 2 was the only group who clearly connected hypotheses, the instructional moves in their lesson plan, and their observations during the research lesson. The following paragraphs trace how this occurred throughout their lesson planning and research lesson debrief.

During the second the professional development session, HS 2 discussed students' challenges elaborating their writing:

Linda: They need to add two or three related details to the topic.

Celia: But so many of my students will write five pages. Last week I only gave them room to write a page because I was like, “You’ve got to tell me what’s important.”

Vicki: So it sounds like pertinent, related details are the key.

Celia: Those details need to stick to the topic because kids can be quite rambling.

The group wanted students to write more details, but they also wanted those details to relate to the composition’s main topic. At the same time, though, children struggled to simultaneously generate and write ideas. Linda described how “[Students] labor over the writing so much—spelling, that kind of thing—that they forget their ideas.” The teachers agreed that the research lesson must address adding pertinent details while also ensuring students could remember the details they wanted to write from sentence to sentence.

As already described, Dana had used a graphic organizer in a previous writing lesson (Appendix J), and the group examined it. Note that the teachers hypothesized how the organizer would improve students’ writing:

Linda: With this graphic organizer they can answer each one of these components [who, what, when, where, why]. Then transcribe it into complete sentences from each bubble [on the organizer].

Tracy: And make sure the topic addresses the assignment. The topic addresses the task, and these [circles on the graphic organizer] relate to the topic.

Celia: And the taking words from it is the hardest thing—They don’t put a lot in each bubble. They’re short thoughts, so how do I make it into a sentence?

Linda: I think [the organizer] helps because there’s one thing in each circle. And they’re adding details just within the bubble. Before we even have them go to the page of writing. So they’re seeing the details in a real condensed version.

Vicki: So you’re saying that they’re using the graphic organizer to plan and that they’re actually generating their ideas on the graphic organizer before they have to start with writing.

Linda: Right.

Vicki: So this breaks it into a more manageable kind of thing.

Linda: Yeah. And having one thing in [each circle of the graphic organizer] makes the focus on “Well, what do I know about that topic?” Then when they go back to make a sentence from it, they’ve got words in there already that they can actually incorporate into the sentence. Half your work is already done. Look at all the words that are on here that are going to be in your sentences.

Through this discussion, the group hypothesized how a graphic organizer might facilitate elaborated writing. It required students to write ideas related to the main topic—who, what, when, where, and why—which ensured they would add details, but also relevant ones. In addition, as Linda noted, first “they’re just adding details within the bubble [on the organizer]. Before we even have them go to the page of writing.” This separated generating details from writing them in the composition, which made writing complete sentences more manageable because “half your work is already done” before the sentence writing began. Furthermore, separating idea generation from writing sentences addressed the challenge of students forgetting what they planned to write. If they forgot their ideas, they could refer to the organizer and then write those ideas into sentences.

Although the group liked the graphic organizer Dana had used, Tracy wondered if its narrative orientation fit the “letter to a friend” genre they wanted students to compose during the research lesson. The group discussed how children often struggled to structure letters appropriately, and the teachers hypothesized that if the organizer was “actually like a letter,” it might help the children write in the proper format. Thus, they designed an organizer that paralleled the structure of a letter (Appendix K).

By using the graphic organizer as the basis of their research lesson, the HS 2 group embedded their hypotheses within the instructional moves in the lesson plan. Through teaching the lesson, the group could test (1) if the organizer led to elaborated

writing (2) if it led to sentences with details about the main topic, (3) if it led to proper letter format, and (4) if separating idea generation from sentence writing helped children remember their ideas while composing. The day before the research lesson, Tiffany and Tracy taught their classes how to write details in each section of the organizer, and the children completed organizers of their own. Then, during the research lesson the teachers demonstrated how to “formulate sentences from graphic organizer into the letter” (Appendix L), and each child used the information from his or her organizer to write a letter. Thus, HS 2’s hypotheses were represented in their research lesson plan and its implementation.

Another hypothesis embedded in the lesson related to helping children write ideas from the graphic organizer in their letters. Linda initially hypothesized children would “transcribe [ideas] into complete sentences from each bubble [on the organizer].” However, Celia noted that putting ideas from the organizer into sentences was the “hardest thing” in the process because “[students] don’t put a lot in each bubble. They’re short thoughts, so how do I make it into a sentence?” Although Linda agreed writing sentences from the organizer’s ideas was challenging for the children, she disagreed with Celia about how to teach this aspect of the lesson. She argued the teacher should model how to write the letter from the ideas on the graphic organizer. Celia, though, thought modeling would bore the children, that they would be “done observing this halfway through.” She suggested students give suggestions about what sentences to include in the letter and the teacher synthesize them into a single sentence. After extensive discussion, the group decided to use Celia’s strategy to involve students more actively in the research lesson. They wrote in the “Teacher Activity” section of the lesson plan: “Ask students to

help formulate sentences from the graphic organizer into letter. Do Think-Pair-Share. Call on a few students to share. Teacher records sentence on paper.” Thus, the group embedded in the lesson plan the hypothesis that students talking, rather than just watching, would facilitate their ability to write complete sentences in their letters.

During the lesson debrief, the HS 2 teachers connected the lesson components with student writing outcomes. First, Dana commented on how the students structured their letters:

Going from this [organizer] to this [letter], the format. Some kids struggled at putting the date where the date needs to be, doing the greeting, where to start. I saw Tiffany, which could be a lesson in itself, folding the paper in half and showing that your date starts on the fold. A lot of kids had to redo because their format was incorrect.

Dana provided evidence that designing the organizer to parallel the letter format did not ensure properly structured letters. In light of this evidence, the group decided a separate lesson on the form of a letter was “a middle step” between completing the organizer and writing the letter itself. Celia also suggested the children draft a letter from the organizer’s ideas and then revise it before writing a final copy, which would provide an opportunity to restructure the letters if children initially used the wrong format.

Dana and Tracy then commented on how the organizer facilitated writing:

Dana: I think the way the graphic organizer helped was getting the related details, writing more than what we were getting. And it works. It takes them a while because we’re asking them to write longer, but...

Tracy: They’re getting the thinking down. They’re not having to do the thinking and writing at the same time, so you don’t have as much fragmented writing.

Although neither teacher provided concrete evidence for their claims, both connected student writing outcomes to using the graphic organizer. Dana contended the organizer “helped...getting the related details” and that students wrote “more” than before. Tracy argued the children produced less “fragmented” writing because they did not need to “do the thinking and writing at the same time.” Both these statements directly connected hypotheses embedded in the lesson design—the organizer would lead to elaborated sentences with details related to the main topic and separating idea generation from writing sentence produced better compositions—with student outcomes.

Another hypothesis embedded in the research lesson was that demonstrating how to write sentences from the graphic organizer phrases would facilitate letters that expressed ideas in complete sentences. However, Linda had noticed:

From the graphic organizer to the letter, some kids said, “Oh, okay, here’s what I wrote in the organizer, so I’m going to write it on that line in my letter.” They need help putting it into a sentence. So we need to model again how to put that information into a sentence.

As the group discussed Linda’s observation, they agreed the lesson had not ensured all students’ success. While many children had written their letters in complete sentences, “a number” copied the phrases directly from the organizer into their letter. This resulted in letters without clear meaning. The group decided to revise the lesson and re-teach it to those who wrote incomplete sentences in their letter.

The HS 2 group had also hypothesized that students suggesting sentences for the letter would engage them more than watching the teacher model letter writing. Although

the teachers agreed students “were all engaged” during the lesson, this strategy proved challenging for the teacher. Tiffany described how:

It didn’t work well trying to decide what actual sentence to put up [in the model letter]. Sometimes I got so many different ideas—Even if there were only three kids I called on, there was never a way to make one sentence because their ideas were on different tracks.

Tracy, too, thought “there wasn’t a flow of ideas” in the letter because it included “pieces of a whole bunch of different kids.” She suggested the lesson be improved by writing about a “common experience” such as a field trip or “the teacher just writing her ideas, not theirs.” The other teachers agreed the lesson had become a confusing because Tiffany tried to put so many different ideas into the letter.

Because the HS 2 group embedded their hypotheses about learning into the research lesson and collected data about how the lesson components impacted student writing, they generated some clear information about writing instruction. Having children complete an organizer before writing led to more elaborated compositions, sentences with related rather than extraneous details, and better compositions because idea generation was separated from composing connected text. In addition, formatting the organizer as a letter helped some, but not all, children structure their letters in the proper form.

Furthermore, having students discuss and suggest sentences for the group letter engaged them in the lesson, but this strategy made the letter writing confusing because the teacher found it difficult to synthesize so many different ideas. From the standpoint of building a knowledge base for teaching writing, this information was clear, interpretable, and potentially useful to other teachers.

The group also generated knowledge about how the lesson might be improved. They noted some students might need a “middle step” between the graphic organizer and letter writing itself, in which the teacher taught the format of a letter. They also suggested, rather than writing a final letter from the graphic organizer, the children write a first draft from the organizer ideas and then compose a final draft in the correct format. In addition, to avoid children giving different ideas to put in one letter, the group suggested the teacher demonstrate a letter either based on her ideas alone or on a group experience. This knowledge, though hypothetical rather based in research lesson observations, was interpretable and potentially usable by other teachers.

Notably, some of the connections between HS 2’s hypotheses about learning and the instructional moves in its research lesson emerged as a result of using the graphic organizer rather than from teachers embedding hypotheses in the lesson plan per se. This occurred because, to an extent, the group designed the classroom teaching experiment in reverse. They began with the instructional approach, a graphic organizer, and then generated reasons why it would work. Thus, the organizer, by its very nature, embodied many of the group’s hypotheses about learning. It required children to write details, it guided them to generate pertinent details, and it separated generating details from writing sentences. This “reverse” approach to designing the research lesson allowed enabling constraint to emerge within the classroom teaching experiment.

Although some of HS 2’s hypotheses were inherently embedded in the graphic organizer, the teachers themselves connected two hypotheses to specific instructional moves they placed in the lesson plan. They designed the organizer to parallel the letter format because they thought it would facilitate correct letter structure, and they included

student talk in the lesson because they thought it would ensure the children's attention and their understanding of how to write complete sentences from the phrases in the graphic organizer. Thus, the teachers themselves created some of the enabling constraint in the classroom teaching experiment.

More than any other lesson study group, HS 2 connected hypotheses, the research lesson plan, and the observations made during lesson implementation. This allowed enabling constraint to emerge in their classroom teaching experiment to an extent that did not occur in other groups. However, HS 2's experiment had elements that were not constrained. The teachers collected minimal data to support some claims, which weakened the epistemic merit of the knowledge they generated. For example, the group offered few details about how the organizer seemed to facilitate elaborated writing. Dana noted that, "I think the way the graphic organizer helped was getting the related details, writing more than what we were getting. And it works." However, no one offered concrete evidence that it worked. The group did not describe differences between details in students' compositions before and after the lesson, and no one provided examples of the "related details" students wrote in their letters. As a result, this knowledge claim might be judged as having weak reliability and validity.

As described at the beginning of this section, enabling constraint occurred in the classroom teaching experiments in two ways: (1) embedding clear hypotheses with related instructional moves into the lesson plan and gathering data about how the lesson impacted student learning and (2) post hoc analysis of what occurred during the research lesson implementation. HS K, DV K, and DV 2 did not embed hypotheses in their lessons and collect data about how those lesson components impacted students' writing but

instead generated knowledge through post hoc lesson analysis. For example, during the lesson debrief, the DV K group discussed why students remained so engaged in the lesson:

Donna: Before you even started, you gave your expectations. That you wanted them to sit crisscross applesauce, that you wanted them to be listening. So you set that parameter up. So they knew what you expected before you started.

Dorothy: You picked a good book. You picked an appropriate piece of literature. Appropriate materials are huge.

Carol: The story was short. Few words on each page. It didn't give them a lot of time to wander.

Rachel: Plus the topic. Special person.

Ellen: High interest.

Dorothy: It was motivating.

The group discussed many aspects of the lesson that seemed to facilitate positive student outcomes, but these were not hypotheses the teachers specifically placed in the lesson plan. The teachers had not previously discussed setting expectations, and although they carefully chose the book, they hypothesized students needed to relate to the book's topic, not that it should have few words on the page, be of high interest, or be motivating.

Even when classroom teaching experiments were severely under constrained, the lesson study groups could generate knowledge from post hoc analysis of the lessons. During DV 2's debrief, the teachers struggled to identify their research lesson goal, but they still connected an aspect of the lesson to student outcomes. Recall this earlier excerpt from the discussion:

Vicki: What was your goal? For the lesson you ended up teaching.

Dorothy: I don't know.

Ellen: Our goal was to make the kids motivated and engaged. To write. To start. That's what our goal was.

Dorothy: Yeah, when we sat down, four weeks ago.

Ellen: That was one of them. And I would say that for our lesson, we achieved that.

Carol: And I think part of the reason that you achieved it was because of you. Because you were very...

Ellen: Animated.

Carol: You were animated, you were energetic. Everything that you did, you were excited.

Dorothy: So the motivation, we wanted to get them motivated. But the only thing that bothers me is, we wanted to get them motivated to write, not just to listen to me.

Although DV 2 lost track of their original research lesson purpose, they created connections between how the lesson *was* implemented and student outcomes. The group had not hypothesized that an energetic teacher would lead to student motivation, but Dorothy infused animation into the lesson, and the teachers attributed students' attention to her excitement.

Because most of the classroom teaching experiments were under constrained, most of the knowledge generated through them occurred through post hoc analysis. HS K, DV K, and DV 2 each generated knowledge about writing instruction in this way. Notably, post hoc analysis allowed the lesson study groups to create the connections needed for enabling constraint in reverse. Rather than embedding hypotheses about learning into the lesson and then gathering data about how well lesson components worked, groups taught the research lesson, determined which aspects were effective, and then generated hypotheses about how those components facilitated learning.

From the standpoint of building a knowledge base for writing instruction, knowledge generated through post hoc analysis was clear enough to be useful. The teachers directly connected teaching with student learning or participation in the lesson and with reasons why a lesson element might have led to those outcomes. Compared to the ambiguous connections between instructional moves and student learning that occurred through under constrained experiments, post hoc analysis created clear relationships that allowed the lesson study groups to make claims about how a lesson worked. The DV K group claimed the book engaged students because it was short, interesting, and motivating, and the DV 2 group claimed Dorothy's excitement caused students to give their full attention to the lesson.

Despite the clear connections groups could make through post hoc analysis, this knowledge had weaker epistemic merit than that generated through embedding a priori connections in the classroom teaching experiment. Because teachers did not specifically design a lesson element to accomplish a particular purpose, it is possible the outcomes they observed could be attributed to something else in the lesson. For example, in the DV 2 debrief, Carol hypothesized students were engaged in the lesson because "The story was short. Few words on each page. It didn't give them a lot of time to wander." However the group had never indicated long books hindered student engagement, and they did not specifically choose this book because it was short or had few words on each page. Thus, the strength of Carol's claim was undermined because she attributed student outcomes to the book after the fact.

Chapter Summary

In this chapter, I demonstrated how instances of over constraint, under constraint, and enabling constraint occurred in the lesson study systems and how each instance impacted the knowledge about writing instruction that emerged from it. Over constraint produced too few possibilities for action, which limited the knowledge about writing instruction a lesson study group could generate. In contrast, under constraint allowed too many uncoordinated possibilities to emerge. Both within the group discussions and within the classroom teaching experiments, under constraint occurred when the lesson study systems became overwhelmed by divergent ideas that did not cohere into identifiable patterns. Under constraint resulted in ambiguous knowledge about teaching writing that had limited meaning and usefulness for the knowledge base.

Instances of enabling constraint occurred when an optimal “space of possibility” (Davis & Sumara, p. 148) emerged with a lesson study system. In the lesson study discussions, enabling constraint was characterized by the elaboration of a limited set of ideas. It allowed teachers to generate alternatives and rationales for teaching approaches without producing too many possibilities unrelated to the lesson focus. In the classroom teaching experiments, enabling constraint was characterized by connections between hypotheses about learning, the instructional moves in the research lesson plan, and the data teachers collected during the research lesson implementation. Instances of enabling constraint allowed interpretable, meaningful, and useful knowledge about writing instruction to emerge from the lesson study systems.

Chapter Six – Nature and Content of the Knowledge

This chapter addresses the research question, *What is the nature and content of the knowledge about writing instruction that emerged through the lesson study systems?*

The first section of the chapter describes the nature of the knowledge along five different continua that emerged from the data analysis. I present examples from the endpoints of each continuum and, because the knowledge that emerged through the lesson study discussions and the knowledge embedded in the lesson study artifacts often fell at different points on these continua, I illustrate each continuum with examples from both the discussions and the documents produced by the groups. I also discuss points at which these continua tended to overlap, describing how knowledge that fell at a particular point on one continuum also tended to fall at particular point on another.

The second section of the chapter describes the four different types of knowledge that emerged through the lesson study systems. While I present each knowledge type separately, in many instances different types emerged simultaneously. In addition, the lesson study group generated knowledge about relationships between different categories of knowledge. Thus, in addition to presenting examples of each knowledge category, I also describe how knowledge co-emerged and the relationships that emerged between different knowledge types.

Nature of the Knowledge about Writing Instruction

The nature of the knowledge generated through the lesson study systems varied along five continua, each of which will be developed in this section: evidence for justification, elaboration, integration, explicitness, and specificity. These continua

represent the range of knowledge about writing instruction that emerged, and while one end of each continuum may initially appear more desirable than the other, this is not necessarily the case. The quality of the knowledge depended on a variety of factors that will be discussed in chapter seven. In this section, I simply describe the nature of knowledge that the lesson study systems produced.

Evidence for Justification

The lesson study groups generated knowledge that varied in its evidence for justification. At one end of the continuum was knowledge for which the teachers provided no justification:

Rachel: So by the end of the year, what are you expecting? That's what I need to know.

Carol: I'm expecting them to have a detailed picture that tells a story. I'm expecting them to be able to describe, to tell me their story, and then I'm expecting them to be able to write at least one sentence about the story. But the writing of the sentence is the last thing that they have to do.

Carol produced detailed knowledge about how children should write by the end of kindergarten, but she gave no evidence for why these were appropriate expectations or why children should learn these things in kindergarten rather than at a different point in their school careers. Instead, she simply generated knowledge about what she wanted the children to do.

It is important to note that the majority of the ideas generated by the lesson study groups fell toward the "no justification" end of the continuum. As explained at the beginning of the chapter, this lack of justification prevented these ideas from meeting the criteria for knowledge described in chapter two. However, a few ideas were justified and therefore would have been considered knowledge even by the stringent definition I

initially developed. For instance, lesson study groups occasionally produced knowledge justified through logical reasoning. The DV 2 group, for example, discussed an instructional approach for its research lesson and reasons it might be effective. Notice how they created a logical explanation of why the approach would work:

Ellen: Here's another question, though, about this whole picture thing. Is it better for them to draw a picture and then to write about it, or make them write it first and then do the picture?

Vicki: What do you guys think? What are the pros and cons of each?

Mandy: Sometimes they focus so much on the picture, and you're like "I want them to get to the words."

Ellen: One assignment is "You've got to draw a picture now." Is that going to be their starter? They have to write about their picture. Would that help?

Nora: I always tell the children that the illustrator draws from the words. And they need to write the words and then they draw about the words. But I don't know.

Mandy: Once they get old enough, maybe. But it goes backwards because they can't write yet, so they draw the picture first.

Ellen: Right. Then, "Okay, write about what you just drew." And I think maybe...

Mandy: That's what they do in kindergarten. They draw first and then they try to write.

Ellen: They have to have details, they have to...Because maybe once they get a picture, maybe that will help the transition. They're able to do that...

Nora: Once they creatively draw, they should be able to write about it.

Ellen: It's the starting place, I think. That's where...Maybe by the end of the year, then they can switch it. "Okay, now try writing the words and then the picture."

Through logical reasoning, DV 2 provided evidence for the potential effectiveness of students drawing pictures and then writing about them. The children struggled to know what to write, and the group hypothesized that picture drawing might act as a writing "starter." They reasoned that all the children "love to draw," and if they drew a detailed

picture, it might “help with the transition” to writing about the picture. Mandy offered evidence that drawing before writing was effective in kindergarten, and Nora theorized that, “once they creatively draw, they should be able to write about it.” Ellen then reasoned that drawing before writing could be a “starting place” and that “by the end of the year” students could learn to write before drawing. While the teachers offered no concrete evidence this hypothesis was accurate, they did produce a chain of reasoning that could be evaluated on the basis of its logic.

Logical reasoning produced hypotheses or theories about the effectiveness of potential instructional approaches. Through this discussion, DV 2 developed of theory of how and why drawing before writing might lead to improved compositions. These reasons served as evidence that this approach to writing instruction was potentially effective. Thus, the claim that drawing would lead to improved writing was substantiated through a chain of logical reasoning.

At a few other times, the lesson study groups generated knowledge justified through evidence grounded in their practice. For example, Courtney described a writing lesson she taught earlier in the year:

Courtney: If you have a group discussion about the story before you send them to write about it...

Mary: Right. To tell what part they like about the story. I say, “Make sure you add that. Make sure you do that. Make sure you write about...”

Courtney: When we did *The Snowy Day*, we went through the pages again after we read it, and we talked about the different things that Peter was doing out in the snowy day. And then we did have great pictures coming back.

Although the claim was somewhat implicit, HS K contended that discussing the story after reading it helped students create “great” pictures. Courtney, and to a lesser extent

Mary, provided evidence from their practice that this instructional approach was effective. They had tried it in their classrooms, and the children produced pictures the teachers deemed satisfactory. However, this evidence was based solely in Mary's and Courtney's interpretations of how the lessons impacted student writing. They indicated the children's pictures were "great" but provided no concrete data to support that claim.

In some other instances, the lesson study groups produced knowledge whose evidence was grounded in specific descriptions of how students responded to instruction. This knowledge most commonly emerged during the debrief discussions when teachers provided evidence for claims from the observations they made during the research lessons. For example, Dana indicated that when the children wrote their letters to a friend, "Some kids struggled at putting the date where the date needs to be, doing the greeting, where to start." This observation led the HS 2 group to conclude the graphic organizer did not ensure students would use proper letter format. Similarly, DV 2 noted that when Dorothy taught the research lesson, she was "animated [and] energetic," and her demeanor seemed to motivate the children to participate in the lesson. Thus, drawing specific connections between instruction and observations about students produced knowledge justified through concrete examples.

Notably, the knowledge embedded in lesson study artifacts tended toward the "no evidence" end of the justification continuum. While the lesson study groups generated evidence through logical reasoning and through connecting examples of student actions to instructional moves within the research lesson, they did not explicitly record this evidence. The only evidence present in the lesson study documents occurred in HS K's *Observation Recording Sheets* (Appendix H). The teachers recorded how students reacted

to each part of the lesson, but they did not explicitly state and justify claims about how the instruction led to student learning. As a result, this knowledge about the relationship between the lesson and students' reactions to it contained no direct evidence about the instruction's effectiveness.

Elaboration

The knowledge generated through the lesson study systems varied in its elaboration. At one end of the continuum were less elaborated ideas, which included only a small amount of detail. The DV 2 group, for example, produced the following ideas while discussing the LPT question, "What kinds of writers do we want to see develop at our school?"

Ellen: (Reading from LPT). What kind of writers do we want to see develop at our school? Well...Can relate to... can express their feelings, can express their thoughts on paper.

Mandy: Right.

Nora: Expressive? Excited?

Mandy: Yeah, we want them to be excited. You know what I don't see them doing any more? When I was in school, I remember they would make us write stories. We would have to make up our own story. But now it's more like, "You're writing about the zoo. You're writing about..." I don't think kids have imaginations to make stories up.

Nora: I know. I don't know which way is best. If kids want to know what to write about or if they want their own.

[The discussion continues with the group describing how their students struggle to think of topics or write about assigned topics.]

DV 2's description of their goal for children's writing included a small amount of detail. The teachers wanted students to "express their feelings...[and] thoughts on paper," create "expressive" writing, and "be excited" about writing. While this description

included several different elements of the writing teachers wanted students produce, it did not detail what constituted “expressive” writing or student excitement about writing.

Thus, the knowledge that emerged through this discussion was relatively unelaborated.

In contrast, HS K generated more elaborated knowledge, which included a large amount of detail. This occurred in response to the LPT question:

Courtney (Writing on the LPT): We want them to elaborate on their writing by...by what?

Kristina: We still want imaginative writers.

Courtney: By adding...(Motioning toward Kristina).

Kristina: Imagination.

Courtney: But are we talking...

Sharon: Adding details?

Courtney: But she said...imagination...ideas... (Pointing to Kristina, thinking)

Kristina: Creative?

Tonya: If I could get to something more than “I am a tree.” Just extending, adding more words.

Mary: Details.

Courtney: (Writing) Descriptive details?

Kristina: We want them to be creative.

Courtney (Reading from LPT): Be creative, when something their thoughts, when... (Gestures for others to help her expand idea). I mean, you want them to be creative, you want them to write their thoughts down, and not just “I was outside playing. I am a tree. I saw a monkey.”

Mary: To describe their pict—Well, in kindergarten, to describe their drawing in more detail, to use their imagination, to be more precise...at a K level.

Courtney: (Writing). To be more precise...

Mary: In their picture—matching their writing with their picture. So if it says “I am a tree,” then like you said...

Sharon: “What’s on your tree?”

Mary: Right.

This description included numerous details about the qualities teachers wanted to see in students’ writing. They wanted writing that was imaginative, descriptive, detailed, extended, precise, had “more” words than what students currently wrote, and described the pictures students drew. The group generated different facets of the writing they wanted children to produce, which created an elaborated picture of what constituted quality writing in kindergarten. Carrie captured this elaborated knowledge on the LPT, writing, “Students who elaborate on their writing by adding descriptive details, words, be creative. At K [kindergarten], to be more precise by matching their picture to their writing by adding details that describe the setting, characters, atmosphere.” This description provided detail about the qualities teachers hoped to foster in the children and their writing.

The knowledge generated through the lesson study group discussions varied along this continuum from less to more elaborated. However, the LPT and lesson plan artifacts tended toward the less elaborated end of the continuum. As described in chapter five, the ideas Martha recorded on HS 2’s LPT (Appendix M) were less detailed than what the group generated through the discussion. This was also true for the HS K group, as evident in the data presented above. Courtney’s written description of kindergarten writing, while detailed, was less elaborated than the knowledge generated in the discussion.

Because the final professional development session at HS was cancelled, the lesson study groups at that school had no opportunity to extend their LPT notes into a

final, typed report. Thus, it was perhaps unsurprising this artifact was less elaborated. However, at DV, the groups devoted the final professional development session to writing a report of the lesson study process and what they learned through it. Yet, their documents also fell toward the less elaborated end of the continuum. The DV 2 group wrote about the relationship between the research lesson and the lesson study goal

(Appendix D):

Specifically we wanted to motivate and to have the students focus on details. Aspects of the lesson we thought would help were drawing a detailed picture before they started the writing process. We felt this strategy would motivate the students to write.

Our hypotheses found that having the students listen to a story about what they would write about, motivated them to draw a detailed picture. Ultimately, we are hoping for a detailed writing piece.

While this description provided some detail, many instructional moves occurred in the lesson beyond students listening to a story and drawing a detailed picture before writing. However, the group did not record how those aspects of the lesson related to accomplishing the lesson study goal.

Although I collected lesson plans only from the HS groups, these documents also contained less elaborated knowledge. During both groups' lesson debrief discussions, the teachers commented on instructional moves made by the research lesson teacher that were not written in the lesson plan. For example, Mary described how her students "act[ed] out" the character's actions (walk like a duck) during the read aloud before the drawing and writing, but this lesson element did not appear in the plan (Appendix G). Thus, the lesson plan artifacts created by the groups were less elaborated than what occurred in the actual lesson.

The one lesson artifact that did fall toward the elaborated end of the continuum was HS K's *Observation Recording Sheets* (Appendix H). The teachers took fairly detailed notes as they observed the research lessons, which produced some elaborated knowledge about what occurred during instruction. Mary, for example, noted that while the teacher was reading the book aloud

- Kids actively talking about title
- 8 students present
- Discussion of author/illustrator
- All students focused on book
- Students stood up to act out footprints
- Some students continuously shouting out

This knowledge included details about how students responded during the read aloud and was therefore toward the elaborated end of the continuum.

Integration

The knowledge generated through the lesson study systems also varied on a continuum from discrete to integrated. Discrete knowledge had less connection between ideas, while integrated knowledge was interconnected. One example of discrete knowledge emerged from the HS 2 group. As described in chapter five, at one point in their discussion these teachers generated discrete ideas about potential teaching actions. They listed a series of ideas, including multiple minilessons, providing numerous opportunities for children to practice writing skills, linking writing skills, holding students accountable for writing skills, a paperwork management system, and connecting writing with speaking and with reading. These ideas had limited connections to each

other, to hypotheses about how they would lead to learning to write, and to the larger research lesson. Each idea was separate from the others, which resulted in discrete knowledge about writing instruction.

Knowledge that was less elaborated tended to be discrete because connections between ideas required a certain level of detail. However, more elaborated knowledge could also fall toward the discrete end of the discrete-integrated continuum. HS K, for instance, produced discrete knowledge about the children who would participate in the research lesson:

Courtney: Some students are writing phonetically and independently.

Mary: Others need assistance with spelling.

Courtney: Well, not spelling, but even sounding out. Some students need support for phonetic writing.

Mary: Some need just copying from the teacher.

Courtney: Some students dictate and copy.

Kristina: Copy or trace.

All: Yeah.

This knowledge about students was fairly detailed, and it was more integrated than the list of teaching actions generated by HS 2 because it covered the range of students' writing skill, which connected the ways "some" children wrote to the ways others wrote. However, it provided descriptions only about student writing. It did not connect students' writing skills to instruction, to theories of why children wrote this way, or to hypotheses about to improve the children's writing.

An example of more integrated knowledge emerged through DV K's discussion of elements to include in the research lesson:

Jodie: (Writing on LPT). Two or three students give examples of their special person...

Rachel: But they all want to share...

Jodie: Well, you just say “two or three” and then when they get to do their elbow partner, they all get to share.

Carol: Yeah, see, the elbow partners helps.

Jodie: That’s giving them a lot of different examples.

Donna: And it gives them a chance to talk.

Jodie: And then they can think of someone, “Oh yeah, my friend, or oh yeah, my neighbor, or oh yeah, my cousin.” They’re not just thinking about the grandpa because that’s what they read, they have a lot of different examples to pick from.

The knowledge about writing instruction that emerged through this discussion, though only moderately detailed, contained multiple connections. First, it connected two different instructional moves temporally within the research lesson. Two or three children would give examples and then all the children would talk to their “elbow partner.” It also connected instruction to predictions about what students would do—all the children would want to share their special person—and reasons why this was problematic—only a few students could share if the teacher only asked for two or three examples. Finally, this knowledge connected the instructional moves to how they would lead to a successful lesson. Elbow partners would allow all students to talk and would offer opportunities for them to hear “a lot of different examples” of a special person, which would provide “a lot of different examples to pick from” when students began writing.

While the knowledge that emerged within the lesson study discussions varied in its integration, the knowledge within the research lesson observation documents tended toward the integrated end of the continuum. These documents connected instructional

moves with anticipated student responses because teachers recorded what students should do at each point in the lesson. For example, in HS 2's lesson, students were to engage in "choral reading" with the teacher as she read the completed letter aloud (Appendix L). In the case of the HS K group, teachers also recorded what students actually did during each lesson step, which connected instructional moves with their effect on the children (Appendix H). Thus, the research lesson observation documents contained knowledge that fell toward the integrated end of the continuum.

Explicitness

The knowledge produced through the lesson study systems also emerged along a continuum from implicit to explicit. Implicit knowledge contained tacit relationships that remained unstated, whereas explicit knowledge contained a straightforward articulation of ideas. One example of implicit knowledge occurred in the HS K group as they discussed the book they would read at the beginning of the lesson:

Kristina: So you guys just want to read a book and base [the writing] on a book, then? When are we going to do the lesson?

[Discussion about when the lesson will be taught and what holidays will occur around that time. Teachers mention different holiday related books.]

Martha: Let's do another winter book. Because we will have snow, at some point.

Tonya: How about *The Snowy Day*?

Mary: I was thinking *The Snowy Day* or *The First Day of Snow*.

Kristina: But you [pointing to Courtney] already did *The Snowy Day*, didn't you?

Courtney: Well, *The First Day of Snow* starts off [reading] *The little boy isn't playing in the snow. When he gets on the school bus he doesn't have any mittens.*

Martha: So is this a good one to save for when we teach problem and solution?

Although no one explicitly stated it, the HS K group produced knowledge about the type of book appropriate for a writing lesson: one related to the time of year the lesson would be taught and one that was not used for any other lesson. Kristina's initial question, "When are we going to do the lesson?" connected the book to the time the lesson would occur, though the connection remained tacit. This unstated connection continued as the group considered only books related to the season and the holidays that occurred near the lesson's implementation.

Through this discussion, HS K also generated implicit knowledge that an appropriate book was one not used in another lesson. The group vetoed *The Snowy Day* because Courtney had already read the book to her class, and they vetoed *The First Day of Snow* because they wanted to "save" it for a lesson about problem and solution. Although the teachers ultimately chose to use *The Snowy Day* in their lesson, they did so only because they needed a "big book" that all the children could easily see, and the only big book available about winter was *The Snow Day*.

Another example of implicit knowledge emerged when the DV K group generated ideas about what "counted" as writing:

Jodie: Should they do a rough copy and then a final draft? Or, no, that's too involved?

Carol: No...they're not ready. I have some kids that can copy, but...By the end of the year we copy sentences, but not...It's better to have it look like what it does and then you can kind of write it under—I write it...

Donna: I take the dictation underneath.

Carol: I always write underneath it. I know some people say you're not supposed to touch...

Rachel: I always do.

Donna: I don't touch their words, but I will sometimes write underneath it.

Rachel: Later on, they can't remember what they said.

Carol: And they can't remember what they said.

Donna: You have some kids that will have all the consonants, and it's readable, but there's some kids that...

Rachel: After a while, they forget.

Although no one explicitly articulated it, DV K generated knowledge about what qualified as writing. The teachers would "take dictation underneath" students' sentences, recording in conventional spelling the words children claimed to have written. They did this because some students' spellings were difficult to interpret, and "later on, [children] can't remember what they said." The teachers' response to children's misspellings, and the group's explanation for it, implicitly defined writing as something readable by the writer, and perhaps others, at a later time. If children forgot what their words said and the teacher could not remind them, their text was not considered "writing."

As described above, implicit knowledge existed when relationships between ideas were present but unstated. In DV K's discussion, the teachers connected writing with its readability at a later time, but this relationship remained tacit. No one said, "We expect the children's writing to be interpretable after they write it," but they designed instruction to ensure this would happen. If the group members recognized they generated a relationship between writing and readability, they did not articulate it. As a result, this implicit knowledge became apparent only after the discussion was analyzed as part of the research process.

Notably, implicit knowledge always fell at the "no evidence" end of the evidence for justification continuum. Because the relationships among ideas in implicit knowledge

remained unstated, perhaps even unrecognized, by the lesson study groups, teachers had no opportunity to provide evidence to justify it. As a result, implicit knowledge was inherently unjustified knowledge.

While DV K's, described above, discussion generated implicit knowledge about what qualified as writing, it also generated explicit knowledge about students' writing skills, instruction, and the relationship between them. Because some children struggled to copy, it was inappropriate to ask them to create final drafts from their initial compositions. Instead, the way to produce readable writing was to allow the writing to "look like what it [looks like]" and then the teacher records the children's words in conventional spelling. This allowed students to remember what they wrote. Thus, explicit knowledge about writing instruction emerged in the midst of implicit knowledge about what constituted writing.

This example from DV K demonstrates how implicit knowledge intertwined with explicit knowledge as the lesson study groups functioned. However, groups often produced ideas in which only explicit knowledge was readily apparent. HS 2, for example, created very explicit knowledge about how to teach children to write a letter from ideas on a graphic organizer:

Vicki: So, how will the lesson start?

Linda: Meet on the rug with an overhead of the organizer because they need to see this information. And then...Do you think chart paper would be good for the letter?

Celia: I think so.

Vicki: So it will be yesterday's overhead? Because it will already be completed?

Linda: Correct. And then the teacher will review the graphic organizer quickly. Take the blank chart paper that's going to represent the paper for the letter. Now,

this is where I think the kids could help [the teacher]. Her thoughts and ideas are now on the overhead and kids could actually compile the sentences to create the sentences with the teacher's information from the organizer.

Vicki: So the kids will actually give the sentences?

Linda: I'd say, "Okay, here's what I wrote down. So what am I going to do now? The first thing I do is—What's the first thing we see? Because each thing, we'll bring it to the next step in your letter. So the first thing is the date. Great. So looking at this paper, where on the chart paper would I put the date?" I'd move this along pretty quickly, working on management of spaces. Then I write "Dear" and talk about capitalization of a person's name and then talk about the comma.

Vicki: Are you expecting them to write one sentence from each box on the organizer or more? Or does it depend on the ideas they have?

Linda: It depends on how they compile the information. If it says three ideas, I would ask, "How can I put those three facts into a sentence?"

This discussion produced explicit knowledge about what would occur during the lesson.

The group described a sequence of instructional moves, how the teacher would use materials such as chart paper and the overhead, what the teacher could say while teaching, and the students' actions during the lesson. This knowledge was straightforward and direct, and while teachers' implicit understandings may have impacted the explicit ideas, it is difficult to identify the implicit knowledge within this discussion.

Like the knowledge generated through the lesson study discussions, knowledge embedded in the lesson plan documents also varied in explicitness. For example, HS K's lesson plan contained explicit knowledge about teacher actions and implicit knowledge about what children would do. Step 4 of the plan (Appendix G) indicated, "Teacher will support [children's] writing by stretching out the word. Teacher will accept what they write and not correct the writing." This statement explicitly described the teacher's actions and implied students might need help hearing and writing the sounds in words. It also implied students might not use conventional spellings because the teacher should

“accept what they write” rather than correcting it. Thus, the knowledge about the instructional sequence was explicit, while knowledge about students fell toward the implicit end of the continuum.

Within the research lesson observation forms, both the HS K and HS 2 groups generated some explicit connections between instructional moves and how they wanted students to respond. For example, HS 2’s *Observation Recording Sheets* (Appendix H) indicated that when the teacher reviewed the graphic organizer, students would be “facing teacher and actively listening.” This provided explicit knowledge about the relationship between students and the instruction at this point in the lesson. However, because the artifact did not explicate what constituted “actively listening,” the relationship between students and the actions in which they should have engaged remained implicit.

The most explicit knowledge contained in the lesson study artifacts was the teacher actions during the lesson and, in the HS K group, knowledge about how students responded during the lesson (Appendix H). Both HS K and HS 2 listed the steps that would occur during the lesson, which produced explicit knowledge about the lesson’s instructional moves. In addition, HS K teachers made precise notes about what occurred during the research lesson observations (Appendix H). This provided explicit knowledge about how students participated in each aspect of the lesson.

Notably, explicit knowledge also tended toward the more elaborated end of the elaboration continuum. This occurred because ideas required a certain level of detail to be explicit. For example, the knowledge DV 2 generated about the writing they wanted students to produce—“expressive”—was implicit because it included little detail. The

group did not articulate the connection between expressive writing and the features they expected student to include in their compositions, so knowledge about the meaning of “expressive writing” remained implicit. In contrast, HS 2’s description of their lesson’s instructional sequence explicitly described what the teacher would do through a detailed explanation of every instructional move, including what the teacher could say. Thus, knowledge that fell toward the explicit end of the continuum also tended to fall toward the elaborated end of the continuum.

Specificity

The knowledge generated through the lesson study systems also fell along a continuum from general to specific. For example, the HS K group produced general knowledge about what students would do in the lesson:

Kristina: Some of our kids are going to go like that [makes scribbling motion in the air], and we’re going to be like, “What did you draw?” and they’ll say, “That’s Peter.”

Mary: That’s their drawing.

Martha: That’s their Peter.

Tonya: Now, we’re going to have some students that are going to want to alter somebody else’s picture. Is there going to be a rule that you can’t draw on somebody else’s picture but you can add something else...?

This knowledge was a generalization about what “some students” would do during the lesson. Although it was likely grounded in teachers’ prior experiences with their students, no one pointed to specific instances where children drew unrecognizable pictures or altered pictures drawn by others. In contrast, HS K produced specific knowledge about students when Courtney shared some of her children’s drawing and writing. She pointed out how one wrote about his visit to the dentist: “When this little guy was writing *dentist*,

he said ‘/d/.’ I said, ‘What’s that letter?’ And he wrote B, but we got BT for *dentist*.”

Through this statement, she generated specific knowledge, grounded in a specific artifact, about the writing a student produced.

General and specific knowledge also emerged from the classroom teaching experiments embedded in the research lessons. During the lesson debrief discussions, teachers evaluated their instruction and its effect on student writing. HS K generated general knowledge about the lesson’s impact on students:

Sharon: Yeah, [the children] labeled. They did pretty well with their labeling, sounding things out. Using letters and sounds. I thought it went pretty well. It was kind of long. They were tired after. They felt that they sat a long time. I think if I changed it, I would just try to speed it up more, so that it wasn’t so long. Maybe not try to get everything in, not feel that they had to have everything down there.

[Group asks her about the writing students did. She leaves to get the chart paper used during the lesson. The discussion continued when she returned.]

Sharon: Looking at [the picture and sentence created during the lesson], I expected them draw more than they did. And yet, they did okay when we started labeling and everything, but I guess I just expected to see tracks in the snow, and to see somebody put an angel down, and stuff like that. And there was minimal drawing. They really needed a lot of encouragement to draw more. But they did better with their sentence, they did pretty good. For what we produced it seems like it took an awful long time. But I was satisfied with it.

Although Sharon provided some specific details about the instruction and students’ reactions to it, she evaluated the lesson’s effectiveness in a general way. She indicated the students “were pretty good” during the lesson and that she “was satisfied with it.” She did not draw connections between any specific features of the instruction and how students responded and instead evaluated the lesson holistically. This created general knowledge: the lesson was good, though long, and the students “did a pretty good job” drawing, labeling, and writing a sentence.

DV 2, in contrast, generated some specific ideas about how their research lesson impacted students:

Nora: I thought the most effective part of the lesson was you showing and explaining the drawing rubric.

Dorothy: We talked about what that would look like.

Ellen: Modeled it.

Dorothy: Modeled it. And then they got going on it, and I left the room. They gave me the pictures. I scored all of them.

Nora: I thought that was really dynamic, how you explained the rubric. I thought that was a real important piece. So that they would know what the picture should be like.

Mandy: She gave back the papers, saying—She explained what it meant if you scored a 1, what it meant if you got a 2. And then she had them share ideas of what they could do to make their better.

Ellen: They just wanted to add to their pictures. They enjoyed it. They all added details, they all colored in. They did *exactly* what we wanted. If anything, they wanted to continue doing it.

Dorothy: As soon as they got it back, when they saw what they got, they pulled out pencils and crayons.

The DV 2 group evaluated how specific aspects of the lesson impacted the pictures students drew. Nora contended Dorothy's explanation and modeling of the rubric helped children understand what elements their pictures should contain. When Dorothy returned the pictures and explained how they could be improved, the children responded by adding details to their pictures. Thus, the group connected specific instructional moves such as explaining, modeling, and scoring the pictures to specific student responses. This created knowledge about how particular features of the lesson impacted students.

The only lesson study artifact that contained knowledge toward the specific end of the continuum was HS K's *Observation Recording Sheets* (Appendix H). The group

collected information about how students responded to each aspect of the lesson, which specifically connected instructional moves with student responses. Martha, for example, indicated that during the read aloud students “made predictions,” gave “personal responses to what [character] did in the snow,” and turned to their neighbor to talk. This information about students’ actions provided specific knowledge about the effects of the instruction.

Content of the Knowledge About Writing Instruction

The content of the knowledge generated through the lesson study systems fell into four categories: knowledge about students, knowledge about instruction, knowledge about the nature of writing, and knowledge about resource use. While I present this knowledge in discrete categories, it was often interconnected either explicitly or implicitly. Therefore, through the following sections, I describe both the different types of content and the relationships between them.

Knowledge About Students

One type of knowledge generated through the lesson study systems was knowledge about students. In some cases, knowledge emerged about individual children. Jodie, for example, described how a student in her class reacted when he could not share his writing: “I had a little boy, when I rang my bell for them to stop, he’s in tears. And I said, ‘What’s the problem?’ He said, ‘I didn’t have a chance for myself to share.’” Similarly, after the research lesson, Jodie’s group generated knowledge about what particular students did:

Carol: There was one child that had some difficulty understanding. She was the only one who didn’t remember the special person she was going to write about.

Jodie: But I think it was because Devon said something about his sister, and even though Sarah doesn't have a sister, "Well, I want to talk about my sister too."
 "But you don't have one." But she wanted one.

The knowledge generated through these discussions was about individual students and specific instances of their participation in writing lessons. One little boy cried when he had no time to share, and Sarah wanted to write about a nonexistent sister. However, most often, knowledge about students indicated what the children could do as a group. For example, as described earlier in this chapter, HS K produced the knowledge that "some children" wrote "phonetically and independently," others "need support for phonetic writing," and others dictated their ideas while the teacher transcribed, and then they copied or traced the teacher's writing. Similarly, in the HS 2 group, Dana described students' skill with graphic organizers:

I think our kids are pretty good at graphic organizers. They can fill it in. If you look at our 4th grade tests, they filled in the boxes, but taking it off and putting it into any kind of cohesive anything, they just couldn't do it.

This knowledge was about the collective of children, that "some children" wrote phonetically and "some" wrote with support, and "our kids" could complete the sections in a graphic organizer but not write a cohesive paragraph from it.

DV K's description of Sarah, HS K's description of how different children wrote, and Dana's description of how students used graphic organizers were each knowledge about what students could do academically. However, knowledge also emerged about what students could do behaviorally. Carol, for example, described:

Everybody in the class was pretty much on task. They were interested, they liked holidays. At first, there were some kids that weren't really talking about holiday. But as soon as a few kids started sharing—You could see their eyes light up. Everyone was talking, and they had more ideas to share. So at that point, you probably had 100% of the class on task.

This knowledge was about how students conducted themselves during the research lesson rather than about what they learned. The children were “on task,” talking to one another and sharing ideas about holidays, but Carol did not comment on what children learned from this part of the lesson. Notably, during the planning sessions, the knowledge that emerged about students tended to provide information about what they could do academically, but during the lesson debriefs, most knowledge about students indicated how they engaged in the lesson from a behavioral standpoint.

The final type of knowledge generated about students was knowledge about their out-of-school lives. Though this knowledge emerged only occasionally, the HS K, DV K, and DV 2 groups each generated at least one instance of it. HS K produced knowledge about the writing skills students learned before entering school, DV K produced knowledge about the support children received at home and which family members raised them, and DV 2 produced knowledge about the writing students completed outside of school.

Knowledge about Instruction

The lesson study groups also generated knowledge about instruction. This knowledge detailed how to orchestrate instructional routines, lessons, or instructional moves within lessons. In the DV K group, for example, Carol explained how she typically taught writing in her classroom:

We did a big book, like *The Snowy Day*, so we wrote a story about something they do in the snow. Two days drawing the picture using only a pencil. The next day I gave it back to them, we looked at the pictures. “What do you need to add to it?” So they spent another five to ten minutes adding details. Next day we talked about “How do you color a picture?” Adding color, how it makes it look, how it brings out your story. So they spent some time coloring it. Then the next day I gave it back and said, “Now your picture’s done, now you need to tell me a sentence about the picture.”

The knowledge Carol generated during this explanation was about an instructional routine. It provided information about how to structure the teaching of writing within a day—five to six minutes drawing the picture, five to ten minutes adding detail—and across a week—two days drawing with pencil, two days coloring, and one day composing a sentence. This knowledge also entailed implicit reasons why the instruction was effective. Students told Carol what was happening in their pictures throughout the week, so “by Friday they know their story” and could state a sentence that she would write down. Through this description of her teaching, then, Carol generated knowledge about a regimen for teaching writing.

In other instances, the lesson study groups generated knowledge about individual lessons and instructional moves within lessons. As described above, HS 2 produced explicit knowledge about the sequence of teacher actions in their research lesson, and they represented this knowledge in their lesson documents (Appendix L). Similarly, HS K generated knowledge about potential ways to teach students to include detail in their writing:

Sharon: I remember doing this with my older kids, but I’ve never done it with kindergarten kids, where we would write on the board, “The girl ran” and then we would say, “The little girl ran fast,” “The little girl with red hair...”

Mary: Right. Build up on that sentence.

Sharon: And we just would keep going and going.

Courtney: You tell them, “Make a movie in your mind, think about what’s happening, think about it.” I draw a picture of my kids. And I start adding a lot of details. The same kind of thing.

This knowledge provided insight into potential writing lessons or instructional moves within a lesson: “build[ing] up” a sentence with details and making “a movie in your

mind” of details to include in a picture. However, like the knowledge Carol produced, it included little insight into the mechanisms that made the instruction effective. Carol’s explanation of teaching described how to conduct writing instruction throughout a week, but except for the idea that talking about the picture led children to the “know their story,” knowledge about how the instruction affected student learning was absent. Similarly, HS K’s knowledge about ways to teach detailed writing did not specify why or how the teaching would lead to learning.

In contrast, some knowledge about instruction included why particular lesson elements were effective. As discussed in chapter five, DV K produced knowledge about several potential topics for writing and why each was appropriate or inappropriate. “Famous person” was an inappropriate topic because children would not know the meaning of “famous. “Ecology” and “recycling” were also inappropriate because these topics would not allow the children to be creative. In contrast, “special person” was appropriate because (1) it could be done anytime since families are always special, (2) many ideas were related to families that children could write about, (3) children liked to write about their families, (4) children knew about their families, (5) it is was easy topic for children to write about, (6) children would be motivated to write about it, (7) it was a topic “close to their heart,” (8) children were comfortable with the topic so they were more apt to write about it, (9) it would appeal to children at all skill levels, and (10) all children could write about it. Thus, this knowledge included both appropriate and inappropriate writing topics and reasons for their appropriateness.

The knowledge about writing topics also demonstrates how lesson study groups generated knowledge about connections between instruction and students. DV K rejected

“famous person” because it was too difficult for students to understand, and they chose “special person” because the children could relate to it and write about it with ease. Therefore, while this knowledge was about instruction, it was also about what students could and could not do in relation to different instructional approaches.

Throughout the lesson study process, groups produced knowledge about relationships between instruction and students. During the research lesson debrief discussions, for instance, teachers described children’s responses to the lessons, which produced knowledge about how instruction impacted students and their learning. One example of such knowledge emerged from the DV 2 group. As described in chapter five, they produced knowledge about the relationship between the lesson’s instructional sequence and the children’s understanding. They determined that discussing holidays and then reading a book about a different topic confused students, which made it difficult for the children to learn from the lesson. Thus, they produced knowledge about how the lesson’s instructional moves related to students’ understanding.

Knowledge about the Nature of Writing

Knowledge about the nature of writing also emerged through the lesson study systems. Notably, this knowledge never occurred independent of other knowledge types but was always connected to knowledge about students, knowledge about instruction, or both. In some instances, such as when HS K described elaborated writing, knowledge about writing emerged in relationship to what teachers wanted students to do. The HS K group wanted children to use their imaginations, add more words, use descriptive details, be creative, and to be precise matching their writing to their picture, which led to a definition of writing as imaginative, descriptive, detailed, creative, and precise.

At other times, knowledge about the nature of writing emerged in relation to both knowledge about students and knowledge about instruction:

Donna: I take the dictation underneath [students' writing].

Carol: I always write underneath it. I know some people say you're not supposed to touch...

Rachel: I always do.

Donna: I don't touch their words, but I will sometimes write underneath it.

Rachel: Later on, they can't remember what they said.

Carol: And they can't remember what they said.

Donna: You have some kids that will have all the consonants, and it's readable, but there's some kids that...

Rachel: After a while, they forget.

As described in a previous section of this chapter, through this discussion DV K defined writing as something readable by the writer at a later time. Notably, though, the teachers never mentioned writing per se. Instead, knowledge about writing emerged from connecting knowledge about students—they forget what they write—and knowledge about instructional moves—teachers write in conventional spellings underneath children's spellings. Thus, knowledge about the nature of writing was intertwined with other knowledge types.

Because the lesson study groups structured lessons to guide students to produce particular types of writing, knowledge about writing necessarily emerged through most of the lesson planning discussions. In the DV 2 group, for example, the teachers discussed whether to show students a model of the writing they wanted them to produce:

Mandy: Do we want to make an example to show them? Or do we just want them to go on their own?

Nora: No. Because they'll copy.

Mandy: Yeah, that's what I was thinking. Because you want to give them an example, but then they copy all your words, all your thoughts.

As in the DV K group, DV 2 generated knowledge about the nature of writing without directly discussing features of that writing. This conversation was about how to orchestrate instructional moves within the lesson to avoid students "copying" from the teacher. However, through this discussion of instruction and students, a definition of writing emerged: writing was original, not copied, words and ideas.

Knowledge about Resource Use

The final of type of knowledge that emerged through the lesson study systems was knowledge about using resources such as materials, books, and time. DV K, for instance, generated knowledge about how to use materials to create a writing product:

Donna: Do you have any templates, like people templates, on oak tag or anything?

Jodie: I have some. They're about this big. (Motions size.)

Donna: Because what you could do is have them do the writing and then give them the tracer, let them trace it out on a piece of drawing paper, draw the person, do the writing on paper and then glue the paper. You glue the paper like the person's holding it.

Through this discussion, knowledge emerged about using templates, glue, and paper to display the children's writing. Each lesson study group produced such knowledge, including HS K's description of using chart paper and markers, HS 2's description of how to use an overhead transparency to make ideas visible, and DV 2's description of using index cards.

In addition, DV K, DV 2, and HS K each generated knowledge about using books in writing lessons. In each case, knowledge emerged about the features of appropriate books. The DV K group, for example, generated the following ideas:

Donna: Did you ever read any of the Mercer Mayer books? There's one about a mom, isn't there?

Carol: Yeah, there's one about a dad. I'm sure there's one about a mom. But you can't...

Donna: You can't say mom because if somebody doesn't have a mom.

Carol: I have one that lives with their grandma.

Jodie: Yeah, a lot of mine are being raised by grandma.

Donna: Here's a thought. The book *Read to Your Bunny*, where the bunny reads to the child. What if you use that and say, "This person was very special to the bunny because big bunny read to little bunny" to make that connection that that was a special person and they did a special thing together.

Carol: But Mercer Mayer, they have grandma, they have grandpa. I don't like little bunny. I don't think it's good literature. But Mercer Mayer, it's pretty good.

Here, DV K produced a description of an appropriate book to launch the lesson: it must be "good literature" that includes the family members all children have. Implicit in this description was the idea the book's content should relate to children's experiences. A book about a mom was unsuitable because some children lived with other family members than their mothers.

DV K expanded the features of appropriate literature during the lesson debrief:

Dorothy: You picked a good book. You picked an appropriate piece of literature. Appropriate materials are huge.

Carol: The story was short. Few words on each page. It didn't give them a lot of time to wander.

Rachel: Plus the topic. Special person.

Ellen: High interest.

Dorothy: It was motivating.

This discussion added to the knowledge the group generated while planning the lesson.

Based on students' reactions to the book, the group concluded literature used in kindergarten writing lessons needed to be short, with few words on each page, and of high interest. They also produced knowledge about why these were important features. Few words on a page and a high interest topic ensured students would be motivated and that their attention would not "wander" during the lesson.

Knowledge about the resource of time also emerged through the lesson study systems. This knowledge always occurred in relation to students and their abilities to engage in instructional activities for long periods of time. DV 2, for example, discussed students' reactions to a lengthy lesson introduction:

Dorothy: Yeah, they need to be engaged in the discussion. They need to have something that is very engaging. Because this now has taken, for them to share out, this has now gone on a good solid 10 minutes. Which is a long time for your kids there. And they haven't done any writing yet.

Ellen: My class is going to break down. The minute they have any opportunity to...

Dorothy: Could you have prepared already, or you ask them, "I want you to think about these holidays that you want to write about." And have holidays already written out and have them physically choose a holiday? Have a bunch of the pre-made on construction paper or something. Because I'm thinking that they have to physically have something in their hands now after listening for so long.

This knowledge about time connected the length of the lesson to how students would react—according to Ellen, "break[ing] down." In addition, it connected lesson length to ways to mitigate long periods of inactivity. Dorothy suggested students "physically choose a holiday" because "they have to physically have something in their hands now

after listening for so long.” Knowledge about time, then, tended to co-emerge with knowledge about students, instruction, and, at times, materials.

Chapter Summary

In this chapter, I described the nature and content of the knowledge about writing instruction that emerged through the lesson study systems. First, I provided examples of knowledge along five different continua, demonstrating how it varied in evidence for justification, elaboration, integration, explicitness, and specificity. I also described how knowledge that emerged through the lesson study discussion fell at different points across these continua, while the knowledge embedded in the lesson study documents sometimes tended only toward one end of continuum. For example, the knowledge generated through discussion varied in its integration, but the knowledge within the research lesson observation forms tended toward the more integrated end of the continuum.

In the second part of the chapter, I described the four categories of content that the lesson study systems generated: knowledge about students, knowledge about instruction, knowledge about the nature of writing, and knowledge about resource use. While this knowledge was discrete—that is, it could be placed in an individual category—different knowledge types co-emerged (Davis & Sumara, 2006) with one another. Furthermore, much of the knowledge generated by the lesson study systems was about relationships between instruction, students, the nature of writing, and materials use.

Chapter Seven – Discussion, Conclusions, and Implications

The purpose of this study was to examine how knowledge about writing instruction emerged through four lesson study systems and to describe the nature and content of that knowledge. As explained in chapters five and six, over constraint, under constraint, and enabling constraint produced different categories of knowledge and knowledge that varied in nature. These findings permit some tentative conclusions about lesson study's usefulness as a mechanism for generating a knowledge base about teaching writing. In this chapter, I present these conclusions and discuss their implications for practice and future research. First, I examine whether the ideas generated by the HS and DV lesson study groups can be considered "knowledge." Second, I compare the content and nature of the knowledge about writing instruction that emerged through this study to the knowledge lesson study proponents indicate is required for a professional knowledge base. Then, based on these comparisons, I discuss how lesson study systems might be altered to yield knowledge that is more useful to the knowledge base. Finally, I suggest directions for future research into lesson study as mechanism for improving knowledge for teaching.

Lesson Study and Knowledge Generation

The definition of knowledge developed in chapter two states that a claim can be considered knowledge if (1) it fits within and across the nested systems in which it exists and (2) the person making the claim can demonstrate that fitness. While the claims made by the HS and DV lesson study groups may have fit across the nested systems of their classrooms, schools, and district, the teachers seldom demonstrated that fit. They rarely

justified their claims with evidence, and as a result, much of what they generated through lesson study did not qualify as knowledge as I defined it in this study.

As explained in chapter three, because the lesson study groups generated only a small amount of knowledge, I decided to analyze everything the groups did produce. This decision allowed me to investigate what emerged from the lesson study systems. However, from an epistemological standpoint, most of the data included in this study cannot be considered knowledge. What the groups generated is probably more accurately described as idea, belief, information, example, impression, conjecture, theory, or some combination of these types of sense making.

As noted in chapter five, applying a different definition of knowledge (Fenstermacher, 1994) might have allowed the ideas generated by the lesson study groups to more easily qualify as “knowledge” rather than as something else. The criteria that teachers justify their claims made the definition of knowledge guiding this study quite stringent, and removing it would have significantly increased the amount of knowledge the teachers produced. However, because the study examined lesson study as a way to produce knowledge for the professional knowledge base, a stringent definition seems appropriate. To remove the criteria that knowledge be justified increases the likelihood that claims based in personal bias or erroneous claims become part of the knowledge base for teaching. Although justified claims do not *ensure* an error-free, unbiased knowledge base, it does make error and bias less likely.

Importantly, while the HS and DV groups did not produce knowledge per se, the ideas that emerged from this lesson study cycle were meaningful and useful to the teachers and therefore had value to them. During the final interviews, all 19 participants

expressed appreciation for the lesson study process and said they found it beneficial for improving their writing pedagogy. However, knowledge that is personally valuable to writing teachers is not necessarily valuable to the knowledge base for teaching writing. Hiebert, Stigler, and Gallimore (2002) contend that practitioner knowledge lacks some of the features required for a professional knowledge base. The findings of this study seem to corroborate that contention. In the following section, I compare what the HS and DV groups generated to Hiebert et al.'s criteria for professional knowledge for the knowledge base.

Lesson Study and a Knowledge Base for Writing Instruction

Hiebert, et al. (2002) contend that for teaching knowledge to be considered professional rather than personal, it must be made public, be represented in a storable and shareable form, and possess a mechanism for verifying and improving the knowledge. Furthermore, they argue that, within the context of lesson study, useful theories consist of teachers' hypotheses about the relationship between instruction and student learning, observations about these connections, and explanations of the connections. In the following sections, I evaluate the knowledge generated by the HS and DV groups according to Hiebert et al.'s criteria to determine if it qualifies as knowledge appropriate for the knowledge base.

Making Knowledge Public

The lesson study groups who participated in this study succeeded in making their personal knowledge about teaching writing public within their group and, to a lesser extent, among the lesson study participants in their schools. As each group discussed their research lesson, different members revealed personal knowledge about students,

instruction, the nature of writing, and resources for teaching. Furthermore, through the interactions that occurred within each group, the collective of teachers refined and transformed the ideas of individuals, which generated knowledge into the public space shared by the group.

Each lesson study group also made its teaching knowledge public to members of the other group at its school. At Deer Valley, the 2nd grade group participated in the kindergarten lesson debrief, and vice versa. In addition, Carol, a member of DV K, observed during Dorothy's teaching of DV 2's research lesson. At Hillside, during the fifth professional development session, each group described its research lesson for the other, presented student writing from the lesson, and reported its plans for the lesson's revision. This sharing about the research lessons made knowledge public beyond the boundaries of the group who generated it.

While the lesson study groups shared teaching knowledge among themselves, this knowledge did not enter a larger public sphere. Two mechanisms currently exist for making knowledge generated through lesson study available beyond the groups who produce it: public research lessons and lesson study reports. Public research lessons are common in Japan, but not in the United States (Lewis & Tsuchida, 1998), and particularly not for novice lesson study groups. I did not provide a public lesson presentation opportunity for the groups in this study, so this option for making their knowledge public was unavailable to them. The lesson study groups at DV did write lesson study reports, but these reports were relatively unelaborated and contained only a fraction of the knowledge actually generated during the lesson study process. As a result,

most of the knowledge produced through these lesson study systems never became public beyond the lesson study participants.

Representing Knowledge

Knowledge for the knowledge base must also be represented in a storable and shareable form because these features make it possible to accumulate knowledge and disseminate it to those in the profession (Hiebert et al., 2002). The findings of this study indicate that knowledge generated through lesson study varies in its representation, and some forms may be more shareable than others. The nature of the knowledge generated by the HS and DV groups and the way in which that knowledge was documented affected how it could be stored and shared with others.

As described in chapter six, the nature of the knowledge that emerged through the lesson study systems varied, and its level of elaboration, integration, explicitness, and specificity impacted how easily it could be shared. For example, elaborated knowledge provided detail that made it usable beyond the groups who generated it. In contrast, less elaborated knowledge, such as DV 2's contention that children's writing should be "expressive," provided a small amount of detail, so it would be difficult for other teachers to utilize this knowledge in their classrooms. Thus, knowledge represented in an elaborated form seemed more shareable than less elaborated knowledge.

Similarly, integrated knowledge seemed more shareable than discrete knowledge. The most integrated knowledge generated by the HS and DV groups connected teaching actions with student learning and explanations about how the instruction led to learning. Other teachers could potentially use this knowledge because it provided information about how to orchestrate successful writing lessons and the mechanisms that made the

lessons effective. Discrete knowledge, however, had fewer connections between teaching and learning, which would make it difficult for those outside the lesson study group to implement it in meaningful ways. For instance, discrete knowledge about children's writing skills was disconnected from instruction and theories of how to improve the writing. Without information about the relationship between students' writing and instruction that might improve it, the knowledge consisted only of student characteristics, and other teachers could not use it in their classrooms.

Explicit knowledge may also be a more usable and shareable representation than implicit knowledge. The explicit knowledge generated by the HS and DV groups was straightforward, articulated, and required little interpretation, which made it clear enough that others could implement it. Conversely, implicit knowledge existed only within the unstated connections between ideas that emerged from the groups' discussions. As a result, it required a considerable amount of interpretive work to identify it. In this study, I identified and interpreted implicit knowledge as a part of the research process, but most lesson study groups do not function with an outside researcher who analyzes the knowledge they produce. If group members do not make their tacit ideas explicit, no other mechanism exists through which outsiders can identify the implicit knowledge generated during lesson study.

The specificity of the knowledge generated through lesson study systems may also impact its usability beyond the groups who produce it. General connections between students and learning, such as "the lesson was good," are probably less usable than specific connections between instructional moves and how each move affects children. For example, knowledge that "the lesson was good" requires teachers to implement the

entire lesson in its original design because there is no way to know which instructional elements could be changed without reducing the lesson's effectiveness. In contrast, knowledge about how each instructional move impacted student learning would allow teachers to recreate portions of lessons effectively, which would permit them to adapt instruction to the contexts in which they work. Consequently, specific knowledge seemed more sharable than general knowledge.

The ways in which the HS and DV teachers documented knowledge also impacted whether it could be stored and shared. Much of the knowledge produced in this study existed only within the group discussions as those discussions occurred. As a result, it remained unavailable to those outside the group. Chokshi and Fernandez (2005) suggest that videos of research lessons as well as written lesson study documents serve as artifacts of the knowledge produced during lesson study. The participants in this study did not produce lesson videos because their research lessons were typically scheduled at the last minute, which made planning for videotaping impossible. They did, however, create documents such as Lesson Planning Tools (LPT), lesson plans, and *Observation Recording Sheets* that represented knowledge in a storable and physically shareable form.

While Chokshi and Fernandez (2005) propose videos and lesson study documents as a way to record the knowledge produced through lesson study, they contend groups “must also embed these work samples in deeper reflections and discussion” (p. 679). They suggest lesson study reports as a means of accomplishing this because a report “collects and transforms the raw materials generated through lesson study into a coherent, stand-alone, and shareable reflection that makes the experiences of the few who engaged in the process relevant to others who did not” (p. 679). In this study, the “raw materials”

generated by the HS and DV groups included the ideas produced during discussion, the notes taken, the lesson plans created, and the observation notes recorded during the research lessons. However, these materials were not transformed into coherent, stand-alone, and therefore shareable documents. The lesson study reports created by the DV groups did not integrate the ideas generated during discussion with ideas embedded in the different lesson study artifacts. Consequently, the knowledge that emerged from the lesson study was represented in a fragmented rather than coherent form.

Furthermore, because the reports included few details, they could not function as stand-alone representations of the knowledge generated by the DV groups. As noted above, unelaborated ideas included too little information to be useable by teachers outside the lesson study group. If a teacher wanted to implement the ideas in DV K's or DV 2's report, she would need to access the group's discussion and other lesson documents in order to make sense of the knowledge the report contained. As a result, the reports could not "stand alone" within the knowledge base.

Verifying and Improving Knowledge

Knowledge within the knowledge base must also be accurate, verifiable, and continually improving (Hiebert, et al., 2002). As described in chapter two, lesson study provides a mechanism for verifying and improving professional knowledge because lesson study groups can test and refine the lessons developed by other groups. This allows them to either confirm the validity of an instructional approach or identify its weaknesses and ways to improve it. However, for this to occur, groups must access the knowledge other lesson study groups produce, which requires that knowledge be represented in a storable and shareable form.

As already noted, only some of the knowledge generated by the HS and DV groups was in a form that could be stored and shared. Most of the knowledge they produced existed only within their discussions, so those outside the groups could not access it. Furthermore, while the knowledge embedded in the lesson study documents was accessible to others, some of it was too unelaborated, discrete, implicit, or general for other groups to use. For example, the lesson plan documents contained few details about how to orchestrate the lesson, and this feature makes it difficult for others to test the lesson's effectiveness and improve the instruction.

Although lesson study provides a mechanism for verifying and improving knowledge across lesson study groups, the knowledge generated by an individual group warrants examination for its validity and usefulness. Hiebert et al. (2002) contend professional knowledge must be accurate, and they argue:

There is no guarantee that the knowledge generated at local sites is correct or even useful. Teachers working together or a teacher working with his or her students might generate knowledge that turns out to undermine rather than improve teaching effectiveness. Local knowledge is immediate and concrete but almost always incomplete and sometimes blind and insular. (p. 8)

Clearly, knowledge that undermines teaching effectiveness and that is blind and insular should not become part of the knowledge base for teaching writing. However, as discussed in chapter two, judging teaching effectiveness proves challenging when educators disagree about the goals of education. "Effectiveness" can only be measured against desired outcomes, and different people have different conceptions of what educational outcomes are appropriate.

One strength of lesson study is that it allows educators in different contexts to set their own criteria for teaching effectiveness and therefore enact their own conceptions of the purposes and goals of education. Given that education in the United States is, to a large extent, locally controlled, this may be appropriate. At the same time, though, if lesson study groups do not share their work with others, blind and insular knowledge may emerge. In this study, the HS and DV groups did not make their knowledge public beyond the lesson study participants, and therefore the ideas they generated may be ineffective or otherwise faulty without the groups realizing it. Thus, sharing knowledge across lesson study groups appears crucial to generating knowledge that can be deemed valid.

Another way to strengthen the validity of knowledge from lesson study is for groups to provide evidence that supports their knowledge claims. As I argued in chapter two, from an epistemological standpoint unjustified claims are opinions or beliefs rather than knowledge. The HS and DV groups produced a range of evidence for the claims they made during lesson study, and some evidence was stronger than others. Claims justified through logical reasoning produced strong hypotheses, but without data to support them, this knowledge had weak validity. Claims grounded in teachers' previous experiences included evidence, though it was based solely on teacher interpretation. For instance, when a teacher claimed an instructional approach she used led to learning, she rarely provided concrete data that demonstrated learning had occurred. In contrast, claims grounded in research lesson observations were supported by raw data as well as teachers' interpretations of that data. This generated knowledge with stronger validity because groups could point to specific examples of how students responded to instruction.

While the validity of the knowledge that makes up the knowledge base is important, its usefulness also matters (Hiebert et al., 2002). As described in the previous section of this chapter, for knowledge to be shareable, it had to also be usable by teachers who did not participate in the lesson study. However, usability and usefulness are not necessarily synonymous. Usable knowledge required elaboration, integration, explicitness, and specificity because these features made it possible for others to interpret and implement that knowledge in their classrooms. Knowledge without these features was difficult to decipher, so those outside the lesson study group would likely struggle to use it in meaningful ways.

The usefulness of knowledge, in contrast, depends on context and on the needs of the user. Knowledge useful in one instance may be useless in another, and knowledge useful to one person may be superfluous to someone else. Clearly, the HS and DV groups generated knowledge useful to them at the time they produced it. Whether it continued to be useful to them or will be useful to others is an open question. As a result, ensuring the knowledge base contains “useful” knowledge is impossible without specifying who finds it useful and in what circumstances.

Creating Useful Theories

Hiebert et al. (2002) argue that professional teaching knowledge should include of theories of teaching. They describe useful theories as consisting of hypotheses about the relationship between instruction and student learning as well as observations and explanations of those relationships. The lesson study groups at HS and DV, in many instances, generated hypotheses about how teaching would lead to learning. They accomplished this by creating chains of logical reasoning about how and why particular

instructional moves would impact students. However, only the HS 2 group made observations explicitly and specifically connected to those hypotheses. In the other groups, under constraint emerged within the classroom teaching experiments and the teachers lost track of their lesson study goals, which prevented them from embedding hypotheses in the research lessons. Without lessons that continued their hypotheses, the groups could not test their theories or create explanations about how instruction related to learning. As a result, in many instances the HS K, DV K, and DV 2 groups produced only hypotheses rather than fully formed theories of teaching.

Notably, as described in chapter five, during the research lesson debriefs, HS K, DV K, and HS 2 made observations about how students reacted to the lessons, which allowed them to create post hoc hypotheses about how instruction prompted learning. However, when groups generated hypotheses after the lesson, their explanations of learning tended to be unelaborated. For example, after observing students during the lesson read aloud, DV K hypothesized that a high interest, motivating book with few words on the page would ensure children's attention during the lesson. This explanation of why the book was effective contained few details compared to the elaborated explanation they generated about the appropriateness and inappropriateness of different writing topics. Thus, creating post hoc hypotheses yielded only partially formed theories of teaching.

The DV 2 group did produce theories of teaching that met the criteria set forth by Hiebert and colleagues (2002). The teachers generated hypotheses about relationships between instruction and student learning, made observations about how the lesson impacted students, and created explanations about how different lesson components led,

or in some cases did not lead, to learning. However, as described in chapter five, the group collected minimal data about some of its hypotheses and in some instances generated minimally elaborated explanations of how and why the lesson affected students in particular ways. As a result, the theories of teaching they generated varied in their completeness.

Overall, the findings indicate that lesson study can, but does not always, produce knowledge that meets criteria for inclusion in the professional knowledge base. The HS and DV groups generated a range of knowledge, some of which was represented in storable and shareable forms and some of which was verifiable and valid. They also produced some well-formed theories of teaching, but they did not make their knowledge public beyond the lesson study participants at their schools. Thus, lesson study will not necessarily generate knowledge that can form an adequate knowledge base. In the following section, I will describe how these findings influence the practice of using lesson study as a means of generating knowledge for teaching.

Implications for Practice

The findings of this study—that lesson study can, but does not always, produce knowledge that meets Hiebert et al.’s (2002) criteria for professional knowledge—raises the question of how lesson study systems might be altered to yield knowledge that is more appropriate for the knowledge base. As described in chapter five, both over constraint and under constraint could temporarily shut down the lesson study process. Furthermore, under constraint produced knowledge that was under elaborated, discrete, implicit, general, and unjustified—features that rendered it inappropriate for inclusion in the knowledge base (Hiebert et al., 2002). In contrast, enabling constraint prompted

knowledge that met the criteria for professional knowledge set forth by lesson study proponents. The question, then, is how to create conditions that prompt enabling constraint within lesson study systems.

The findings of this study point to three challenges of prompting enabling constraint. The first is that it emerges through interactions between system elements rather than from any single element. For example, the initial questions on the LPT functioned differently in each lesson study group. As described in chapter five, the questions were designed to create enabling constraint in the lesson study discussion, but they over constrained DV K and DV 2, under constrained HS 2, and created enabling constraint in HS K. Also as described in chapter five, the lesson study process under constrained the classroom teaching experiments in the HS K, DV K, and DV 2 groups but enabled it in the HS 2 group. Thus, interactions between each group and the LPT and between groups and the lesson study process created or prevented enabling constraint. As a result, neither the LPT nor the lesson study process could ensure enabling constraint would emerge.

The second challenge of prompting enabling constraint is that an event within a lesson study system could simultaneously over constrain and enable knowledge generation. For example, in the DV K group, Carol explained how she taught writing, and the group decided to adopt her lesson format. This event enabled the group to generate knowledge about writing instruction because, before this occurred, the group had been discussing student and school based reasons for the gap in children's writing skills. Deciding to adopt Carol's lesson format refocused the discussion on instruction. This refocusing ended that instance of over constraint and allowed the group to continue

planning the research lesson rather than discuss factors beyond their control. At the same time, however, adopting Carol's lesson format may have over constrained the knowledge generated because the group did not consider alternative possibilities. Thus, the discussion about Carol's writing instruction both enabled and constrained knowledge generation.

A third challenge to creating enabling constraint is specifying the optimal balance of divergent possibilities and coherence among those possibilities. On the one hand, as described in chapter five, generating alternatives for action allowed the HS and DV groups to develop elaborated knowledge and create rationales for the appropriateness of one alternative over the others. Too many possibilities, though, could overwhelm a group, making it difficult for them to make sense of the divergent ideas they generated. However, it is difficult to determine the tipping point at which diverse ideas become a detriment rather than a resource to lesson study groups. In some instances, groups produced elaborated, integrated, explicit, specific, and justified knowledge from a large number of divergent ideas. In other instances, only a few different ideas prompted under constraint and knowledge that was unelaborated, discrete, and entailed no evidence for its justification.

As the above challenges outline, enabling constraint emerges through interactions, emerges simultaneously with over and under constraint, and occurs through an unspecified balance of possibilities and coherence. Consequently, it cannot be predicted or directly controlled. However, the findings of this study do point to some factors that make the emergence of enabling constraint more likely. As described in chapter five, enabling constraint occurred in the lesson study discussions when teachers expressed

uncertainty about how to design the research lesson, when they generated connections between divergent ideas, when they ignored some of the extraneous ideas produced by group members, and when they periodically synthesized the different ideas that had emerged during the discussion. Notably, while each of these actions contributed individually to enabling constraint, sustained instances seem to require two or more of these actions simultaneously. This suggests enabling constraint occurred through an interaction of these different teacher actions.

The findings of this study also provide insight into how enabling constraint occurs in classroom teaching experiments. When the HS and DV groups generated hypotheses about how instruction would lead to learning, embedded those hypotheses in their research lesson, and collected data about how the lesson impacted students, enabling constraint emerged. Through it, groups produce integrated, justified knowledge that met Hiebert et al.'s (2002) criteria of "useful" theories of teaching. In contrast, when lesson goals shifted during planning, under constraint emerged within the teaching experiments, which produced knowledge that was ambiguous and difficult to interpret.

The question that follows from these findings is how to help lesson study groups engage in the actions that lead to enabling constraint and avoid the ones that lead to over and under constraint. While this question needs further research, this study points to some possibilities. In the remainder of this section, I draw on the study's findings to suggest some potential ways to prompt enabling constraint in lesson study systems.

First, lesson study groups could intentionally engage in the actions that seem to lead to enabling constraint in their discussions. They could pause their conversation periodically to connect and synthesize the ideas and deliberately offer rationales for the

ideas they suggest. They could also intentionally choose between ideas—for instance, overtly rejecting some teaching approaches in favor of others—to prevent becoming overwhelmed by too much divergent information. Learning to engage in these actions would require lesson study facilitators to explicitly explain how to undertake the lesson study process. It might also require artifacts that prompt teachers to synthesize and offer rationales.

Another possible way to promote enabling constraint within lesson study groups is to help teachers orchestrate well-designed classroom teaching experiments. As reported in the lesson study literature (Fernandez, Cannon, & Chokshi, 2003), lesson study groups sometimes struggle to develop meaningful, researchable hypotheses and the means for testing them, use concrete data as evidence, and generalize the findings of their research lesson. Similarly, in this study, three of the groups struggled to design a classroom teaching experiment that allowed them to test their hypotheses and gather data about it. These findings are perhaps unsurprising given that the teaching experiment is implicit in the research lesson. Explicitly identifying the teaching experiment and helping teachers align hypotheses, instruction, and data collected during the lesson implementation would likely improve the knowledge generated through lesson study.

Notably, HS 2 did connect hypotheses, instructional moves, and observations during the research lesson and therefore produced a well-formed theory of teaching (Hiebert et al., 2002) when the other groups did not. While it is not completely clear why this happened, the graphic organizer they used as the basis of their lesson may have contributed to their ability to conduct a successful classroom teaching experiment. As explained in chapter five, the group hypothesized how using the organizer would improve

student writing. As a result, simply including the organizer in the lesson tested their hypothesis. In contrast, the other groups developed elaborate, multilayered hypotheses that they struggled to flesh out in the lessons. Therefore it is possible that designing lessons around pre-designed tools, like a graphic organizer, might help lesson study groups create successful classroom teaching experiments, allowing them to generate better-formed theories of teaching.

Another way to promote enabling constraint may be to alter the systems in which the lesson study groups operate. As described in chapters two and four, lesson study groups operate within the systems of their schools and districts, and ideas and artifacts from those systems interact with the groups. In this study, for example, the district curriculum may have hindered enabling constraint in the classroom teaching experiments conducted by the HS and DV groups. As indicated in chapter five, the curriculum consisted of student performance indicators and suggested instructional strategies rather than lesson plans. This differed dramatically from the curriculum that supports Japanese lesson study. Japanese teachers plan from the national *Course of Study* (Lewis, 2002), so they begin with lessons that have specific goals and related lesson plans with embedded hypotheses about instruction. In contrast, the HS and DV groups had to create these connections as they planned their lessons. Given the challenge of that task, it is perhaps unsurprising that only HS 2 accomplished it. Providing groups with well-designed lesson plans on which to base their research lessons, then, may yield knowledge that is more appropriate for the knowledge base.

Another example of how larger systems may hinder enabling constraint in lesson study systems is HS and DV's district policy around lesson planning. The district did not

require teachers to write lesson plans beyond indicating the lesson topic and the corresponding page numbers in the textbook. This norm for documenting lessons contrasted significantly with the norms of creating a “complex and meaty document” (Fernandez & Yoshida, 2004, p. 35) as a lesson study report. The dramatic difference between the district’s expectations for daily lesson plans and those of lesson study may explain why the lesson study reports were, in many respects, not very elaborated.

Notably, changing district and school systems so they better prompt enabling constraint within lesson groups is a large and challenging undertaking. Thus, it seems the most feasible approach to promoting enabling constraint would be helping lesson study groups understand the types of knowledge needed for inclusion in the knowledge base. This understanding could guide their work, enabling them to interact with each other, the lesson study documents, and the lesson study process in ways that produced well-formed, storable, shareable, valid theories of teaching—even if such interactions were not supported by the school and district. In complexity terms, this means the desired outcome of the lesson study—knowledge that fits the criteria for professional knowledge—would serve as the organizing pattern for the actions undertaken by the lesson study group. This would allow divergent ideas to cohere in ways consistent with the knowledge needed for the knowledge base.

Perhaps an effective way for lesson study groups to learn the types of knowledge needed for the knowledge base is for them to read and use well-written lesson study reports. These reports demonstrate how lesson study groups represent knowledge in the professional base (Chokshi & Fernandez, 2005), so using them provides an ideal mechanism for familiarizing novice groups with the knowledge they should strive to

produce. Teachers could use the knowledge embedded in the reports in their own classrooms by teaching the research lessons or adapting the lessons for their students. This would allow them to experience first hand the features that make the knowledge usable. This experience might then facilitate their understandings of the knowledge they should seek to produce during lesson study.

Directions for Future Research

Although several researchers have proposed lesson study as a means of generating a knowledge base for teaching, this study is the first to empirically examine and describe the knowledge produced by lesson study groups. Consequently, many questions remain about lesson study's ability to produce knowledge for teaching. Some of these questions can be resolved through research, but others involve larger epistemological, ethical, and practical issues. In the following paragraphs, I will first describe the empirical work needed to confirm and extend the findings of the study. I will then discuss the theoretical, moral, and pragmatic dimensions questions that arose the research.

Because this study is the first of its kind, it would be useful for other researchers to replicate it. The lesson study groups who participated in this research produced particular types of knowledge that possessed particular qualities, and the knowledge generated by other lesson study groups might differ in nature or content. In addition, knowledge may emerge through different mechanisms in other lesson study groups, and different factors may influence knowledge production. Thus, more work is needed to confirm, refute, or refine the findings of this study.

Because I conducted this research with novice lesson study participants, it would be particularly useful for future research to examine the knowledge that emerges when

experienced groups conduct lesson study. Both the HS K and DV 2 groups indicated they would make changes to future research lessons, which suggests groups modify how they conduct lesson study as they gain experience with the process. As a result, experienced groups might undertake lesson study differently than novices and therefore produce knowledge that differs from what was generated in this study. Similarly, it would also be useful to investigate how the knowledge produced by novice groups changes as they become more experienced lesson study participants. Such research might provide insight into how the knowledge and ideas that emerge from lesson study change as participants mature in their understandings of the lesson study process.

Based on the findings of this study, I suggested several ways to potentially improve the knowledge that emerges from lesson study: (1) help teachers intentionally engage in actions that lead to enabling constraint, (2) help them develop well-designed classroom teaching experiments, (3) help them understand the features of professional knowledge so they can create conditions that allow it to emerge and (4) provide them strong lesson plans on which to base their research lessons. While these suggestions make sense in light of the study results, they need to be empirically tested. Furthermore, I suggested that the policies, norms, and curriculum of schools and districts might need to be altered so those systems better promote enabling constraint. While the lesson study literature provides some insights into the features of schools that make lesson study possible (Puchner & Taylor, 2006) more research is needed to determine what aspects of districts and schools are required to support enabling constraint in lesson study groups.

Future research could also address whether making the classroom teaching experiment more explicit changes the knowledge that emerges from it. In this study, I

asked teachers to plan a lesson but did not explain that the lesson represented a teaching experiment. I did not provide guidance about how to embed hypotheses about teaching and learning into the lesson plan, make observations related to those hypotheses, or create explanations about how the lesson led to better student writing. Providing explicit direction about how to conduct the classroom teaching experiment might significantly impact the knowledge that emerges from it.

Furthermore, given the challenges of creating enabling constraint in lesson study groups, more research is needed into how to prompt conditions that support the generation of knowledge appropriate for the knowledge base. In this study, I intervened in the groups as little as possible, and this may have contributed to the over and under constraint that occurred. It is possible that a facilitator could design artifacts or processes that support factors, such as periodically summarizing and synthesizing ideas, that make enabling constraint more likely. Future research could examine how more direction from lesson study facilitators impacts the knowledge that emerges from the lesson study process.

While empirical research can resolve some questions about lesson study's usefulness as a means of generating a knowledge base for teaching, other questions are philosophical, ethical, and pragmatic. From a philosophical standpoint, identifying a knowledge base for teaching is challenging because it is difficult to pinpoint the location of knowledge needed for teaching. In this study, I located teaching knowledge simultaneously in the lesson study discussions, the documents produced by the groups, and the minds of the lesson study participants. While this decision was epistemologically sound (see chapters two and three), from a pragmatic standpoint it required me to analyze

every statement made and every document produced in the lesson study groups because these were sources of teaching knowledge. However, analyzing the partially formed ideas that emerged in the discussions and the idiosyncratic notes teachers wrote about research lessons impacted the findings in a significant and unforeseen way.

Partially formed ideas and idiosyncratic notes were unelaborated, discrete, and missing evidence for justification. Including them in the analysis increased the amount of knowledge that did not meet Hiebert et al.'s (2005) professional knowledge criteria, making it appear that most of the ideas generated by the HS and DV groups were inappropriate for the knowledge base. However, this finding obscured the fact that partially formed ideas and quickly jotted notes served as necessary precursors to elaborated, integrated, and justified knowledge. Thus, knowledge deemed unusable and lacking in validity in the knowledge base was usable and valid in the knowledge generation process. Future studies will also need to wrestle with where to locate teaching knowledge and how those decisions impact conclusions about lesson study's usefulness as knowledge generating process.

A philosophical and pragmatic question arising from this study is how to determine when knowledge from lesson study is elaborated, integrated, explicit, specific, and valid "enough" to include it in the knowledge base. While unelaborated, discrete, implicit, and general knowledge is limited in its usability, at some point on the continua it becomes usable. Similarly, knowledge with weak validity may still be valid enough to be part of the knowledge base. The answers to just how elaborated, integrated, explicit, specific, and justified knowledge must be lie in judgment and ideology rather than empirical findings.

This study also raises the question of how to include useful knowledge in the knowledge base. As described above, usefulness depends on context and on the needs of the user, so even knowledge that does not meet Hiebert et al.'s (2005) criteria for professional knowledge could be useful to someone in the profession. For example, hypotheses that are not a part of fully formed theories may be useful if teachers embed them in lessons and find them effective. This suggests that stringent criteria for what constitutes professional knowledge may exclude knowledge useful to some members of the profession.

From an ethical and practical standpoint, there is also a question of whether lesson study *should* be used as the primary mechanism for generating a knowledge base for teaching. Building the knowledge base through lesson study places the primary responsibility for knowledge production on classroom teachers. Given their other responsibilities, is it reasonable to expect them to also develop the knowledge base? The findings of this study indicate that lesson study groups do not automatically generate knowledge that meets the criteria of professional knowledge. Consequently, they may need to learn how to use lesson study for the purpose of generating the knowledge base, which will take time away from other aspects of their work.

A final question, which must be addressed both philosophically and empirically, is whether the criteria for professional knowledge used in this study is appropriate for judging what knowledge be included in the knowledge base. Clearly, fully formed theories of teaching that are public, valid, and represented in shareable and storable forms have advantages over ideas that do not meet these criteria. However, the findings of this study indicate that generating such knowledge through lesson study will prove

challenging and perhaps eliminate ideas that could be useful to the profession. One avenue for gathering evidence about the appropriateness of the criteria is to investigate how teachers use the knowledge generated by other lesson study groups. What are the features of knowledge they find usable and useful? What are the features of knowledge they find irrelevant or difficult to use? The answers to these questions can provide insight into how to develop a knowledge base for teaching.

Significance of the Study

As described in chapters one and two, it is not currently clear what knowledge elementary teachers need to know in order to teach writing well. As a result, it is difficult for teacher educators to design professional development that helps teachers develop a strong writing pedagogy. What is needed is a better understanding of the knowledge base that informs teaching writing to elementary children. However, educators disagree about how to build such a knowledge base. Several different strands of research—including research on teaching, research on teachers' knowledge, and research on essential teaching knowledge—have been suggested as the basis of a knowledge base for teaching. However, this work has been criticized for excluding the knowledge teachers themselves produce as they engage in their day-to-day work.

Several researchers (Chokshi & Fernandez, 2005; Hiebert et al., 2002; Lewis, Perry, & Murata, 2006) have suggested lesson study as a mechanism for including knowledge generated by teachers in the professional knowledge base. However, until now, no one has examined lesson study as a knowledge producing process or described the knowledge that emerges as teachers conduct lesson study cycles. This study contributes to that gap. The finding that lesson study can, but does not always, produce

knowledge that meets criteria for inclusion in the professional knowledge base is significant. It raises caution about rushing to build a knowledge base on the work of lesson study groups. Given that some of the knowledge generated by the HS and DV groups met Hiebert et al.'s (2002) criteria for professional knowledge and some did not, it is not clear whether lesson study is a reliable way to generate knowledge suitable for the knowledge base. More research and theorizing about lesson study are needed to determine how lesson study can most successfully contribute to building a knowledge base for teaching.

This study is also significant because it provides insight into how lesson study could yield knowledge appropriate for the knowledge base. In general, instances of enabling constraint in the lesson study groups produced knowledge that met the criteria for professional knowledge. The findings point to the challenges of prompting enabling constraint, but they also point to some possible ways to promote it. Consequently, the study contributes to educators' understanding of how lesson study may best be leveraged as a mechanism for generating knowledge for the knowledge base for teaching. It also furthers the discussion about lesson study's usefulness and reliability as a knowledge generating process.

Finally, the study contributes to efforts to use complexity theory as a way to conceptualize and analyze educational research. This is an important contribution because scholars are increasingly calling for the use of complexity theory in research in teaching and teachers (Opfer & Pedder, 2011). By theorizing the lesson study groups as complex, knowledge producing systems, this study identified how over constraint, under constraint, and enabling constraint—ideas from complexity theory—operated in one

professional development setting. Future research could build upon these findings to examine how enablers and constraints operate in other educational settings.

Appendix A – Coding Scheme: Content of the Knowledge

Codes: Content of the Knowledge

Students

- (1) What students can do/should be able to do academically/developmentally
- (2) What students can do/should be able to do behaviorally
- (3) Theorizing/predicting what students will be able to do academically/developmentally
- (4) Theorizing/predicting what students will be able to do academically/developmentally
- (5) Knowledge of individual students
- (6) Knowledge of students as a group
- (7) Knowledge about students' out-of-school lives

Instruction

- (8) Knowledge of instructional routines
- (9) Knowledge of how they taught writing in the past
- (10) Knowledge of specific instructional moves
- (11) Knowledge of specific lessons
- (12) Theorizing why a lesson/instructional move/routine worked
- (13) Structuring the lesson so students can do it academically/developmentally
- (14) Structuring the lesson so students can do it behaviorally
- (15) Structuring the lesson so teacher can manage it with available resources

The Nature of Writing

- (16) What/how they want students to write
- (17) What/how students currently write
- (18) How to structure a lesson to get students to write in certain ways
- (19) Structuring the writing so students can do it academically
- (20) Structuring the writing so students can do it behaviorally

Resources Use

- (21) Materials available/needed
- (22) Appropriateness of different materials
- (23) Time available
- (24) Time lesson will take

Appendix B – A Tool for Planning and Describing Research Lessons
(called Lesson Planning Tool by Study Participants)

A Tool for Planning and Describing Research Lessons

I. Background Information

A. Goal of the lesson study group:

- What kind of writers do we want to see develop at our school?
- What kinds of writers are actually developing at our school? What evidence do we have for this?
- Why does this gap between our aspirations and reality exist? How can we close this gap?
- How will the lesson study goal we have chosen help us close this gap?
- How will we go about exploring our lesson study goal?

B. Overview of context

This is a description of the lesson context. It is a way for you to set up and put in perspective the lesson. You should include all the background information that you feel is needed to appreciate the lesson in a meaningful way. For example, you may want to provide information regarding your students, what they know, and why this lesson is important to their continued learning and development. You may also want to mention any teaching techniques or approaches that you will be exploring in this lesson. Make this personal to you as the teacher, your classroom, and your individual students.

- What do the observers need to know about my classroom?
- Who are my students? What do they already know? What strategies do they use? What motivates them?
- Why is this lesson important for my students?
- What should students know at the end of the lesson? What else would I like them to gain from this lesson?

II. Lesson Information

A. Title of research lesson:

B. How this lesson is related to the curriculum:

C. How this research lesson is related to the lesson study goal:

This is a description of the specific goals of this lesson.

- What specific skill, strategies, or ways of thinking about writing would you like to address through this lesson?
- What aspects of the lesson will address the goal? In what ways?
- What is/are your hypothesis/hypotheses about how this lesson will accomplish your goal?

E. Evaluation

Describe your plan for evaluating the success of your lesson overall. Explain what you will look for in your students' in-class behavior and work products to determine if your lesson goals were met. You will also want to be specific about what you are looking to collect as information or evidence about (related to your lesson study goals)

- How will we determine if students understood the concepts taught in this lesson?
- What would be appropriate homework? What will I be able to tell about the students from their homework?
- What information do I want to collect in the course of this lesson?

Teacher Activity	Anticipated Student Thinking and Activities	Points to Notice and Evaluate	Materials and Strategies

Appendix C – Deer Valley K Group Final Lesson Study Report

A Tool for Planning and Describing Research Lessons

I. Background Information

A. Goal of the lesson study group:

- What kind of writers do we want to see develop at our school?
- What kinds of writers are actually developing at our school? What evidence do we have for this?
- Why does this gap between our aspirations and reality exist? How can we close this gap?
- How will the lesson study goal we have chosen help us close this gap?
- How will we go about exploring our lesson study goal?

1. Kids that can effectively communicate using 6 traits of writing.
2. Very disjointed writers are developing. They are not using any kinds of strategies...they are just writing from what they know. Evidence? -Poor writing samples. Also, we are not giving feedback that moves them forward. We are giving evaluative feedback instead of instructive.
3. We do not have a curriculum. By creating a writing curriculum and teachers having a better understanding of how children learn how to write.
4. The lesson study goal helped us better understand how to teach writing to our students. We also learned how our students should be engaged during a lesson. We didn't just simply focus on delivering the lesson.
5. We are going to share this lesson study with other teachers in the building.

B. Overview of context

This is a description of the lesson context. It is a way for you to set up and put in perspective the lesson. You should include all the background information that you feel is needed to appreciate the lesson in a meaningful way. For example, you may want to provide information regarding your students, what they know, and why this lesson is important to their continued learning and development. You may also want to mention any teaching techniques or approaches that you will be exploring in this lesson. Make this personal to you as the teacher, your classroom, and your individual students.

- What do the observers need to know about my classroom?
 - Who are my students? What do they already know? What strategies do they use? What motivates them?
 - Why is this lesson important for my students?
 - What should students know at the end of the lesson? What else would I like them to gain from this lesson?
1. This was a heterogeneous mix of 18 kindergarten students.
 2. Students interaction with writing is generally at a pictorial level at this point. There are no conventions being taught at this time. Children are generally motivated at this age but teacher enthusiasm added to this along with having prior knowledge of the content.
 3. The modeling of this lesson was key because the students were able to take more risks and they knew what was expected of them. The question was not open-ended. They knew they had to draw a detailed picture along with 1 sentence.
 4. Students should know what special means, who is special to them and how to include details in their illustrations. They should also know how to write a sentence including...uppercase letter at the beginning of the sentence, spacing and demonstrating phonemic awareness.

II. Lesson Information

A. Title of research lesson:

Who is Special to Me?

B. How this lesson is related to the curriculum:

This was a read-aloud lesson. Students demonstrated listening comprehension skills. This is related to the curriculum because it is part of English Language Arts. They were using listening, reading, and writing skills.

C. How this research lesson is related to the lesson study goal:

This is a description of the specific goals of this lesson.

- What specific skill, strategies, or ways of thinking about writing would you like to address through this lesson?
- What aspects of the lesson will address the goal? In what ways?
- What is/are your hypothesis/hypotheses about how this lesson will accomplish your goal?

1. The students should have a purpose for writing and their sentences should also be aligned with their illustrations.
2. Students had the opportunity to share their special person with a partner and then had an opportunity to complete a writing piece about their special person.
3. As we were planning this lesson, we found that modeling was going to be extremely important so we made sure this was a substantial part of the lesson.

E. Evaluation

Describe your plan for evaluating the success of your lesson overall. Explain what you will look for in your students' in-class behavior and work products to determine if your lesson goals were met. You will also want to be specific about what you are looking to collect as information or evidence about (related to your lesson study goals)

- How will we determine if students understood the concepts taught in this lesson?
 - What would be appropriate homework? What will I be able to tell about the students from their homework?
 - What information do I want to collect in the course of this lesson?
-
1. If the students demonstrate the skills they learned in future assignments
 2. To draw a detailed picture of something or someone who is special to them besides the person they initially drew. They could then write a sentence for their picture using the skills they learned in this lesson.
 3. We want to know if the students were engaged and if we could describe the behaviors that demonstrated engagement.

Appendix D – Deer Valley 2 Group Final Lesson Study Report

A Tool for Planning and Describing Research Lessons

I. Background Information

A. Goal of the lesson study group:

- What kind of writers do we want to see develop at our school?
- What kinds of writers are actually developing at our school? What evidence do we have for this?
- Why does this gap between our aspirations and reality exist? How can we close this gap?
- How will the lesson study goal we have chosen help us close this gap?
- How will we go about exploring our lesson study goal?

We want to see students engaged in writing. We also want them to be able to develop the skills such as conventions, organization, voice, fluency, word choice, ideas and content.

We are seeing students struggling with the whole writing process. The evidence we have seen in the classroom is their inability to work independently. The students are not carrying over what they have learned into all of their writing pieces.

This gap exists because we did not know the writing expectations of writing for each grade level. Additionally, we do not have a writing curriculum to guide our teachers. We close this gap by implementing a writing curriculum for each grade level.

The lesson study goals, motivation, will help to close the gap by taking the fear factor out of the equation. We found the book we used in the lesson helped give them a connection to their writing.

As a school, we are explaining to teachers, who were not apart of our lesson study, the lesson study process.

B. Overview of context

This is a description of the lesson context. It is a way for you to set up and put in perspective the lesson. You should include all the background information that you feel is needed to appreciate the lesson in a meaningful way. For example, you may want to provide information regarding your students, what they know, and why this lesson is important to their continued learning and development. You may also want to mention any teaching techniques or approaches that you will be exploring in this lesson. Make this personal to you as the teacher, your classroom, and your individual students.

- What do the observers need to know about my classroom?
- Who are my students? What do they already know? What strategies do they use? What motivates them?
- Why is this lesson important for my students?
- What should students know at the end of the lesson? What else would I like them to gain from this lesson?

The observers need to know that the levels of our students are varied, it was a heterogeneous group of about 20 students.

My students are from various backgrounds with various abilities. They have been exposed to four square writing in first grade. Strategies they have used are word wall, inventive spelling, dictionaries, various resources in the room to find words. The students get motivated when the teacher models something that relates to their lives and when the teacher shows excitement.

This lesson was important for my students because we gave them a strategy to search for details which they can apply in future writing pieces.

Students should know the importance of listening for details. I would like the students to become motivated writers.

II. Lesson Information

A. Title of research lesson: Holidays

B. How this lesson is related to the curriculum:

Using the topic of holidays was part of our Social Studies curriculum.

C. How this research lesson is related to the lesson study goal:

This is a description of the specific goals of this lesson.

- What specific skill, strategies, or ways of thinking about writing would you like to address through this lesson?
- What aspects of the lesson will address the goal? In what ways?
- What is/are your hypothesis/hypotheses about how this lesson will accomplish your goal?

Specifically we wanted to motivate and to have the students focus on details. Aspects of the lesson we thought would help were drawing a detailed picture before they started the writing process. We felt this strategy would motivate the students to write.

Our hypotheses found that having the students listen to a story about what they would write about, motivated them to draw a detailed picture. Ultimately, we are hoping for a detailed writing piece.

E. Evaluation

Describe your plan for evaluating the success of your lesson overall. Explain what you will look for in your students' in-class behavior and work products to determine if your lesson goals were met. You will also want to be specific about what you are looking to collect as information or evidence about (related to your lesson study goals)

- How will we determine if students understood the concepts taught in this lesson?
- What would be appropriate homework? What will I be able to tell about the students from their homework?
- What information do I want to collect in the course of this lesson?

-By their detailed pictures.

-Do a rewrite of the book, Nothing Ever Happens In Our House!!!!

-Whether they understood the concept of details.

-Wished we had them do a writing piece/list details from their pictures.

Appendix E – Lesson Study Handouts

What is a Research Lesson?

1. Actual classroom lesson with students, watched by other teachers
2. Planned collaboratively, over time
3. Brings to life teachers' goal or vision
4. Discussed by teachers and sometimes outside commentators

Working on a Research Lesson

Research and preparation

Teachers jointly draw up a detailed plan of the research lesson.

Implementation

One teacher teaches the study lesson in a real classroom while other group members look on.

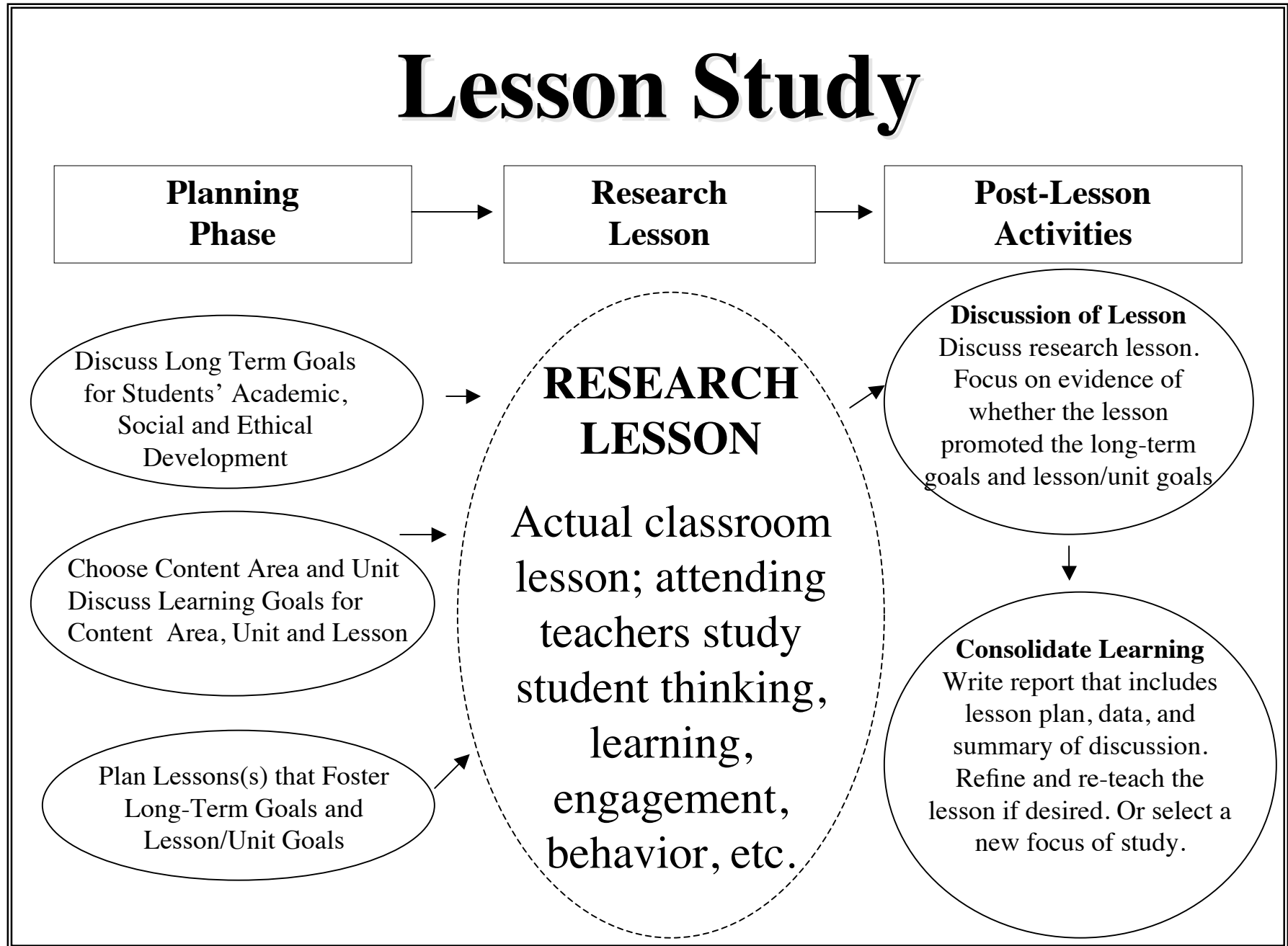
Reflection and improvement

The group comes together to discuss their observations of the lesson.

Second implementation and reflection (optional but recommended)

Another teacher teaches the study lesson in a second classroom while group members look on; this is followed by the group coming together again to discuss the observed instruction.

Figure 1



Professional Development

TRADITIONAL

- Begins with answer
- Driven by an “expert”
- Communication
trainer -> teachers
- Research informs practice

RESEARCH LESSONS

- Begins with question
- Driven by participants
- Communication among
teachers
- Practice is research

Choosing a Lesson Study Theme

Think about the students you serve.

Your Ideals:

What qualities would you like these students to have 5 years from now?

The Actual:

List their qualities now.

The Gap:

Compare the ideal and the actual. What are the gaps that you would most like to work on?

The Research Theme: (long-term goal)

State positively the ideal student qualities you choose to work on. For example:

*Fundamental academic skills that will ensure students' progress
and a rich sense of human rights.*

Research Lesson Planning Questions

What do students currently understand about this topic?

What do we want them to understand at the end of the unit?

What's the sequence of experiences (lessons) that will propel students from what they currently understand to what we want them to know?

Which lesson in the unit will be selected as the research lesson?

What will students need to know before this lesson?

What will they learn during this lesson?

What is the sequence of experience through which they will learn it?

How will students respond to the questions and activities in the lesson? What problems and misconceptions will arise and how will we respond to them?

What evidence should we gather and discuss about student learning, motivation, and behavior? What data collection forms are needed to do this?

Data Collected During Research Lesson

Academic Learning

- How did students' understanding of this topic/strategy change from the beginning of the lesson to the end? How do we know?
- Did students shift from a simple to a complex conception of this topic?
- Did students' demonstrate this strategy in their written pieces?

Motivation

- Percent of children who raised hands
- Body language, "aha" comments

Social Behavior

- How many times do students refer to and build on classmates' comments?
- How often do the five quietest students speak up?

Student Attitudes Toward Lesson

- What did the students say they liked and disliked about the lesson?

Lesson Study Report

- Records thinking about the lesson
- Records original and revised lesson plan
- Allows other teachers to learn from the research lesson

Appendix F – Writing Professional Development Books

- Calkins, L. M. (1994). *The art of teaching writing*. Portsmouth, NH: Heinemann.
- Calkins, L. M., Chiarella, M., Cruz, M. C., Gillette, C., Kesler, T., & Martinelli, M. (2007). *Units of study for teaching writing, grades 3-5*. Portsmouth, NH: Heinemann.
- Calkins, L. M., Hartman, A., & White, Z. R. (2005). *One to one: The art of conferring with young writers*. Portsmouth, NH: Heinemann.
- Calkins, L. M., White, Z. R., Bleichman, P., Louis, N., Hartman, A., Pessah, L., et al. (2003). *Units of study for primary writing: A yearlong curriculum (K-2)*. Portsmouth, NH: Heinemann.
- Culham, R. (2003). *6+1 traits of writing*. New York: Scholastic.
- Horn, M., & Jacobbe, M. E. (2007). *Talking, drawing, writing: Lessons for our youngest writers*. Portland, ME: Stenhouse.
- Kurstedt, R., & Koutras, M. (2000). *Teaching writing with picture books as models*. New York: Scholastic.
- Lane, B. (1993). *After the end: Teaching and learning creative revision*. Portsmouth, NH: Heinemann.
- McCarrier, A., Pinnell, G. S., & Fountas, I. C. (1999). *Interactive writing: How language and literacy come together, K-2*. Portsmouth, NH: Heinemann.
- Portalupi, J., & Fletcher, R. (1998). *Craft lessons: Teaching writing K-8*. Portland, ME: Stenhouse.
- Portalupi, J., & Fletcher, R. (2001). *Nonfiction craft lessons: Teaching information writing K-8*. Portland, ME: Stenhouse.
- Ray, K. W. (1999). *Wondrous words: Writers and writing in the elementary classroom*. Urbana, IL: National Council of Teachers of English.
- Spandel, V. (2004). *Creating young writers: Using the six traits to enrich the writing process in primary classrooms*. New York: Pearson.

Appendix G – Hillside K Group's Research Lesson Plan

Kindergarten Lesson Study on Writing Elaboration

Objectives:

Students will be able to orally give details about the story.
Students will be able to draw and label a class drawing.

Materials needed:

Large Copy of *The Snowy Day* by Ezra Jack Keats
Chart paper or any large paper
Markers

Lesson:

Teacher will read aloud the story, *The Snowy Day*.

Teacher will lead a group discussion about the book including the following story elements: main characters(s), the story setting and details/events.

Teacher will then tell children they are going to use the large paper to draw a picture together about the story and put labels on their picture.

Teacher will support their writing by stretching out the word. Teacher will accept what they write and NOT correct the writing.

Continue drawing and labeling and adding details until you have the main point of the story on paper.

Teacher will respond by saying:

Look at the picture we made together.

In a minute tell you partner about the picture. (Knee to Knee partner or assigned partners).

After ‘think’ time each partner will tell the other about the picture. You may need to explain how this is done if you have not used this procedure called *Think, Pair, Share* in your classroom.

Ask one of the pairs of students to give you their sentence about the picture. Model writing the sentence below the picture. Think out loud about how you can elaborate the writing by noticing another detail in the picture to write about . Teacher writes a second sentence.

Appendix H – Hillside K Group's Observation Recording Sheets

#1
pg

Began 11:00 Ended 11:42

Presenter:

Observation Recording Sheet

Date 2/13/08

Teacher Activity	Things to Observe	Notes from Observation
Teacher reads the story to the whole group.	<p>Were students facing the teacher.</p> <p>Were the students active listeners.</p>	<p>- Kids actively talking about title (season, etc)</p> <p>- 8 stu. present</p> <p>- discussion of Author/Ill.</p> <p>- All stu. focused on book.</p> <p>- stu. stood up to act out footprints. (In & out)</p> <p>- Some stu. continuously shouting out.</p>
Teacher will lead group discussion incorporating story elements.	Were responses accurate?	<p>- Millie incorporated story while reading</p> <p>- One stu. responded that I did not understand but Millie re-worded for other kids.</p> <p>- stu. acted out making snowballs.</p>
Teacher will facilitate drawing and labeling the picture.	Were students able to draw and label the picture?	<p>- When told they were going to draw picture together, stu. gasped for excitement.</p> <p>- chose and wrote kids names on board w/idea to allow stu. to choose which picture to draw</p> <p>- picked name from sticks.</p> <p>- Millie decided to have kids use pencil first.</p>
Teacher will model writing a sentence relating to the picture.	<p>Did the students discuss with their partner during Think, Pair, Share?</p> <p>Were students able to dictate a sentence about the picture?</p>	<p>- Stu. Separated to different spots w/ partner.</p> <p>- Stu. took turns sharing</p> <p>- heard conversations pertaining to story (timer set for 3min?)</p> <p>- stu. responded to teacher their favorite part of story - they voted - Millie used graph to show which picture won.</p>

teacher: placed big book on instrument stand.
: she cut big piece of white paper for kids to draw on.

Kids excited and actively engaged in helping/sounding out words for sentence.
- compared words in sentence to words used to label (ie) how many in sentence

pg #2

Presenter:

Observation Recording Sheet

Date

Teacher Activity	Things to Observe	Notes from Observation
Teacher reads the story to the whole group.	Were students facing the teacher. Were the students active listeners.	- few interruptions due to 2 kids shouting out (about book, though)
Teacher will lead group discussion incorporating story elements.	Were responses accurate?	- Some responses were shouting out, some were chosen by raised hand. - Millie drew in kids who had not answered any questions yet.
Teacher will facilitate drawing and labeling the picture.	Were students able to draw and label the picture?	- Stu. automatically used words to describe to other stu. what he was drawing. - Kids asked, "What is a snow fort" and stu. replied right away. - One student wanted to draw mom & other
Teacher will model writing a sentence relating to the picture.	Did the students discuss with their partner during Think, Pair, Share? Were students able to dictate a sentence about the picture?	- Kids should "There is no mom!" - stx 2 kids kids

- Stu. encouraging and congratulating the person drawing for their wonderful ideas and drawing.
 - Some stu. are beginning to wobble around on rug.
 - Some stu. were reluctant on labeling so Millie helped w/ some sounds, but did not correct.
 - Stu. pointed out spelling mistake - Millie reminded that not his turn.
- When done - Kids went back and made some corrections. Then talked again about picture while Millie wrote sent.

Observation Recording Sheet

Lesson Topic: Elaboration Date: 2/13/08 10:20

Presenter: _____ Observer: _____

Teacher Activity	Things to Observe	Notes from Observation
Teacher reads the story to the whole group.	<p>Were students facing the teacher?</p> <p>Were the students active listeners?</p>	<p>yes Are learning spaces assigned? (Taylor & Andrew)</p> <p>Made predictions</p> <p>Many personal responses to what Peter did in the show.</p> <p>Turn to your neighbor- what will happen to snowball when P takes it inside</p>
Teacher will lead group discussion incorporating story elements.	<p>Were responses accurate? Asked what did Peter do on the snowy day?</p> <ul style="list-style-type: none"> • angels • footprints • stick • climbed a big mountain & slid down • hit the tree and snow hit his head • snowman • snowball in his pocket 	<p>Sketching after the story pretending to be Peter in the snow,</p>
Teacher will facilitate drawing and labeling the picture.	<p>Were students able to draw and label the picture?</p> <p>volunteers since it was the first time</p> <p>Do we want to draw a line where the label should go? Need enough space</p>	<p>Maybe coloring in should be done at a different time (add this to the lesson plan itself)</p> <p>1st picture - Peter in snowsuit</p> <p>label - hat (teacher stretched out)</p> <p>• Peter</p>
Teacher will model writing a sentence relating to the picture.	<p>Did the students discuss with their partner during Think, Pair, Share?</p> <p>Were students able to dictate a sentence about the picture?</p>	

Talk about guidelines of what kids can say to each other

11⁰⁵ Observation Recording Sheet

Lesson Topic: The Snowy Day Date: Thurs. 3/6

Presenter: _____ Observer: _____

Teacher Activity	Things to Observe	Notes from Observation
Teacher reads the story to the whole group.	Were students facing the teacher. Were the students active listeners.	Teacher had to rearrange several students in whole group before reading. Teacher explained activity: read, draw, write. Remind students to put hands down - not time to ask questions.
Teacher will lead group discussion incorporating story elements.	Were responses accurate?	Teacher ask question about what the front cover is about. - Alsey has that book - "The" - His name was George - "The Snowy Day" - Title - author - was able to tell
Teacher will facilitate drawing and labeling the picture.	Were students able to draw and label the picture?	
Teacher will model writing a sentence relating to the picture.	Did the students discuss with their partner during Think, Pair, Share? Were students able to dictate a sentence about the picture?	

* Teacher pointed to each word.
- loud voice
- remind students to listen who is in the story who is in the what is in the story.
- remind student to look w/ eyes to read word.
- Stop & ask student - what do you do w/ wet socks?
- quiet response *

reminding students - sitting & writing

After end of story - Teacher asked student to stand & find their reading partner - Praised those who are together - those w/o a partner was assigned a partner - students sat knee - knee (activity was done in whole group circle) the group focused on tying shoes - Teacher focused/redirection students by asking what they need to do now: being encourage to

2

quiet group & refocus to next step.

- all students facing teacher & board
- Teacher called on student what can we draw
What was the little boy's name. Boy stated
He didn't know and he needed help.
Student raised their hands and he called on
one.
- Teacher asked what colors should he used to
draw Peter -
- Teacher hand colors that student need.
- * Teacher asked other students to think what
else can we draw while student is drawing Peter
- Teacher called another student up to draw
her response - 2 students working on paper
- * Who was in the story? ~~name~~ 2 boys, where
is the dad. Mom

Remind student of rules - raise hands to be call on

* redirected students talking

* Asked questions "What do we call people & animal
in a story?"

- ① He was dragging his feet.
- ② The characters.

Wrote the word "Character" on board -
praise them for beautiful job on character.

* called ^{some} student to write Peter - student sound out
word.

Teacher shared how student is saying each
sound as he writes out Peter, Boy.

- redirect group to listen to ~~the~~ another student
write Boy - note how student is soundly & looking
at alphabet chart for letters - Point to chart.

Appendix I – Lesson Study Debrief Protocol

Lesson Study Debrief Guide

1. Choose a recorder to take notes and a moderator to help keep the discussion on track. The moderator will “chunk” the lesson into sections for discussion.

2. The Instructor’s Reflections (5 min, uninterrupted)

The teacher who taught the lesson comments on

- What worked
- What didn’t work
- What could be changed about the lesson

3. Presentation and Discussion of Data from the Research Lesson

Each observer comments on one aspect of the lesson at a time (based on how the facilitator chunks it). If an observer thinks of something not being discussed at the time, s/he can write it down for later.

The observers review the information collected during the lesson, focusing on

- What they observed the children doing during the lesson
- How the students were progressing toward the learning goal of the lesson
- Any student work collected during the lesson

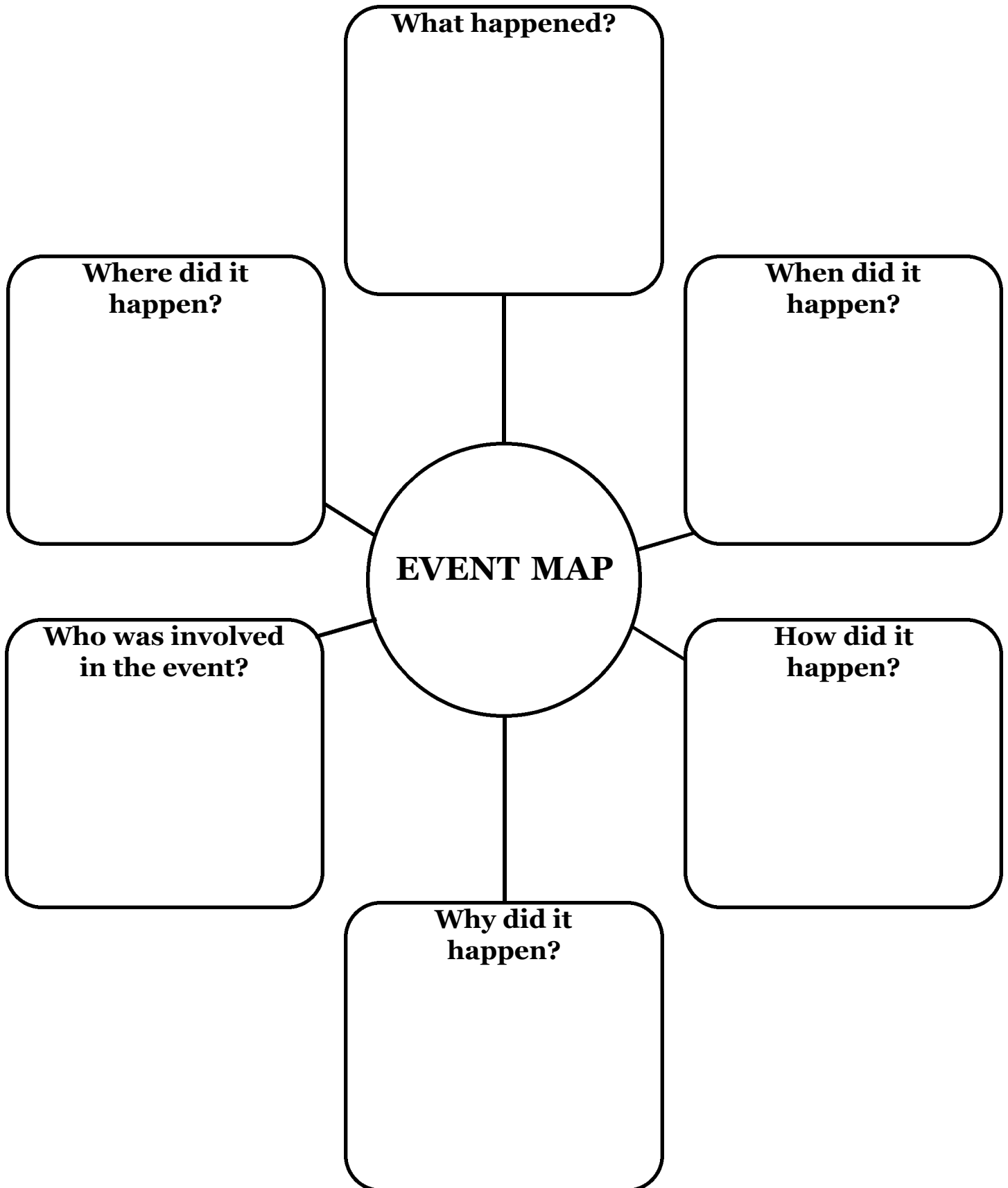
4. General Discussion

The group discusses

- What students learned from the lesson
- How specific elements of the lesson design promoted students’ learning
- What steps should be taken to improve or extend the lesson

Appendix J – Graphic Organizer Used as Model by Hillside 2 Group

Event Map



Appendix K – Graphic Organizer Created by Hillside 2 Group

Date

Dear

Greeting: Who

Body: Purpose for letter

Body: Two reasons I love you

Body: Thank you for...

Body: I wish you a ...

Love,

Appendix L – Hillside 2 Group’s Observation Recording Sheet

Presenter:

Observation Recording Sheet Date

Teacher Activity	Things to observe	Notes from observation
Meet at rug and review graphic organizer	Students facing teacher and actively listening	
Ask students to help formulate sentences from graphic organizer into letter. Do a Think-Pair-Share. Call on a few students to share. Teacher records sentences on paper.	During T-P-S students will be both talking Participation of students	
Reread letter to show how it flows	Choral reading with teacher	
Facilitate letters from graphic organizers	*Letter format *Complete Sentences *Elaboration of sentences by some students	

Appendix M – Hillside K Group's Lesson Planning Tool Notes

Vicki - I think
these are my notes when
I sat w/ the 2nd gr. team

A Tool for Planning and Describing Research Lessons

I. Background Information

A. Goal of the lesson study group:

- What kind of writers do we want to see develop at our school?
- What kinds of writers are actually developing at our school? What evidence do we have for this?
- Why does this gap between our aspirations and reality exist? How can we close this gap?
- How will the lesson study goal we have chosen help us close this gap?
- How will we go about exploring our lesson study goal?

Each mini lesson will have a one day product

Link skills from one day to another

- Multiple mini lessons on same target skill (Elaboration)

w/ time to practice after each mini lesson
less is best

kids don't get it the first time

Some form in folder for FCA

Paperback management system

transfer of writing skill across the day
fiction to non-fiction

teach & observe in pairs

skills in writing - target in speaking & reading

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